Prepared By
International Technical Education Department
International Technical Service

INTERNATIONAL
280-401/402/403/404
RETAIL TERMINAL

FIELD SERVICE AND
TRAINING MANUAL

MS-5061
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SECTION A
INTRODUCTION

The International Phase II 280 Retail Terminal is a point-of-sale (POS) input device used to process transaction data associated with department, specialty, and discount store applications. The basic function of the 280 is similar to a mechanical register used for the same applications. It is also similar in size and appearance to a mechanical register (refer to figure A-1). The architecture of the 280 is similar to that of a sophisticated EDP system containing a central processing unit, input/output devices, and a programmable read/write memory. The 280 is also similar in technology to an EDP system since most of the integral functions are performed by electronic components. The physical printing and paper-feeding functions are performed mechanically under the direction of the electronics.

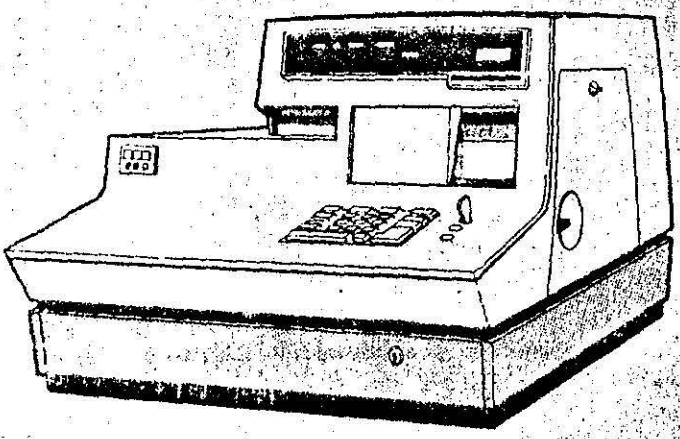


Figure A-1 280 retail terminal

The 280 accepts transaction data which is either manually entered through the 10-key keyboard or automatically entered through a color bar code reader. The operator is lead through a transaction by the 280 which illuminates operator instructions on a display panel. Transaction data may be printed on a journal tape, a customer receipt, and a sales slip. This data is also indicated for operator convenience on a display panel.

The International Phase II 280 Retail Terminal is a refeatured version of the International Phase I terminal. The Phase II terminal provides increased user oriented flexibility while retaining much of the original hardware.

DATA COLLECTION

The 280 automatically transmits transaction information to a data collector. The data collector records the information on magnetic tape for future processing at a central processing facility. One of two types of data collectors can be used with the 280: The 723 Data Collector and the 761 Cassette Terminal Recorder.

The 723 Data Collector is normally located away from the main sales area. One 723 can accept data transmissions from up to 48 280 terminals. Online check and credit authorization is available when using the 723.

When using the 761 Cassette Terminal Recorder, one 761 is required for each 280. The 761 is connected to the 280 TCU common port and can be located up to 10 feet from the terminal. The 761 is not an online unit. Therefore, online check and credit authorization is not available when using the 761 as a data collector.

MODEL DEFINITION

Four models of the International Phase II 280 are presently available. The models differ in the type of data collector used and whether or not the 1/2 Penny feature is incorporated.

The model numbers are assigned as follows:

280-401 — Basic model using the 723 as a data collector.

280-402 — Basic model using the 761 as a data collector.

~~280-403 — 1/2 Penny model using the 723 as a data collector.~~

~~280-404 — 1/2 Penny model using the 761 as a data collector.~~

Use of the 723 as a data collector requires that the 280 have a terminal communications adapter (TCA) and a modem to control transmissions. These modules are mounted internally within the 280 cabinet. The TCA and modem are not required when the 761 is employed as the data collector since the 761 is connected to the TCU common port. Also, firmware requirements are different for the two data collectors. The 280 can be modified to change from one data collector to the other by (1) adding or deleting the TCA and modem, (2) changing the TCU ROM board, and (3) changing the read/write memory programming.

The 1/2 Penny model is available to accommodate currencies using the 1/2 penny (0.005). In this model, the decimal point key on the basic model is changed to a 1/2 penny key. The operator's display in the basic model is changed to one which displays the decimal point between the 3rd and 4th digits from the right. The display in the basic model has the decimal point between the 2nd and 3rd digits. The firmware is also different from the basic model. The 280 can be modified from a basic model to a 1/2 Penny model by changing (1) one key caption, (2) the operator's display, (3) the ROM board in the TCU, and (4) the read/write memory programming.

The basic model can be changed to accommodate inflated currencies by changing the operator's display and the read/write memory programming. The display used for inflated currencies is the same one used for the 1/2 Penny model (decimal point between 3rd and 4th digits). However, for inflated currencies, the decimal point is used simply as a punctuation mark between the hundreds and thousands digit positions rather than to indicate decimal amounts as in the 1/2 Penny model. There is no separate model number for terminals with the inflated currency feature.

Table A-1 Modules required for 280 models

Module Number	Name	280-401	280-402	280-403	280-404
M01-01-280-006	Keyboard	X	X	X	X
M15-01-280-006	TCU	X			
M15-01-280-007	TCU		X		
M15-01-280-004	TCU			X	
M15-01-280-005	TCU				X
M17-02-280-000	Read/Write Memory	X	X	X	X
M18-01-STD	TIC (Terminal Indicator Control)	X	X	X	X
M19-01-STD	Clock	X	X	X	X
M30-03-280-000	Misc. Components	X	X	X	X
M32-02-280	Power Supply*	X	X	X	X
M43-01-280	Printer*	X	X	X	X
M50-02-280-000	TCA (Terminal Communications Adapter)	X		X	
M51-01-STD	Modem	X		X	
M90-03-280-003	Display**	X	X		
M90-03-280-001	Display**	X	X	X	X

* See Table A-2 for options available.

** Display 001 can replace display 003 in models 401 and 402 only if the terminal is programmed for inflated currency.

UNIT ORGANIZATION

The 280 unit is made up of a group of integrated modular subassemblies which provide the overall performance capabilities of the unit. These modular subassemblies are referred to as modules and are assigned module numbers when physically located in the 280. Modular devices located outside the cabinet of the 280, but controlled by the 280 are referred to as remote units. The remote units are assigned class numbers and packaged in their own cabinets. Four remote units are optional to the 280 configuration and when installed are interfaced through a connector in the 280 base.

Table A-1 lists the modules required by 280 model number. Table A-2 lists the module options available. Table A-3 provides a brief description of the function of each module and remote unit.

Figures A-2 and A-3 are block diagrams depicting the modules and remote units associated with each 280 model.

Table A-2 Module options

Module Number	Name	Description
M32-02-280-000	Power Supply	50 Hz
M32-02-280-001	Power Supply	60 Hz
M43-01-280-000	Printer	115V, 60 Hz
M43-01-280-001	Printer	220V, 50 Hz
M43-01-280-002	Printer	240V, 50 Hz
M43-01-280-003	Printer	95V, 50 Hz, Japanese Typewheels
M43-01-280-004	Printer	95V, 60 Hz, Japanese Typewheels
M43-01-280-005	Printer	115V, 50 Hz

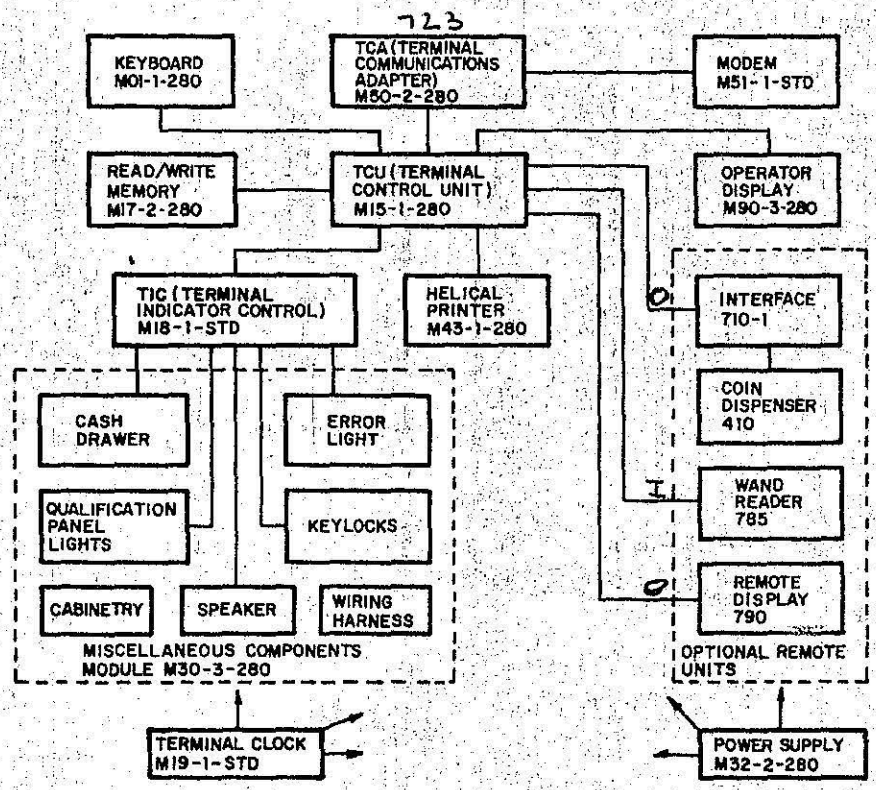


Figure A-2 Organization block diagram, models 280-401 and ~~280-403~~

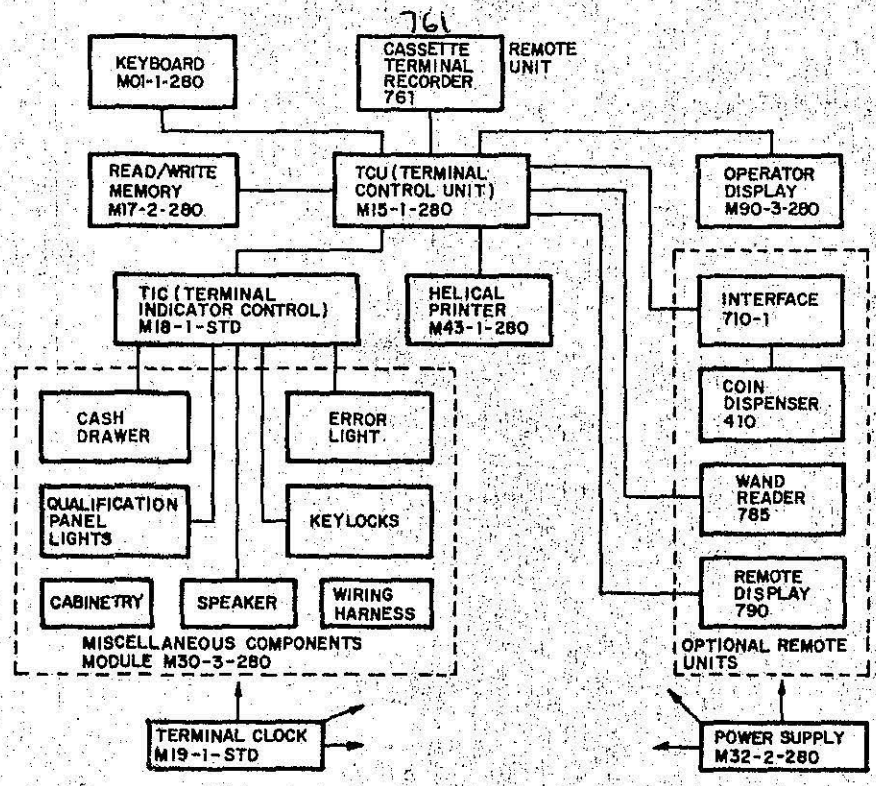


Figure A-3 Organization block diagram, models 280-402 and ~~280-404~~

ELECTRICAL REQUIREMENTS

The 280 will accept the following input voltages supplied by a single phase, three wire service:

95 Volts ± 10 Volts	60 Hz ± 1 Hz
115 Volts ± 10%	60 Hz ± 1 Hz
95 Volts ± 10 Volts	50 Hz ± 1 Hz
115 Volts ± 10%	50 Hz ± 1 Hz
220 Volts ± 20 Volts	50 Hz ± 1 Hz
240 Volts ± 20 Volts	50 Hz ± 1 Hz

The maximum input current is four amperes at 100 Volts.

The output voltages of the power supply are the following:

+12 v.d.c. ±5 percent
- 12 v.d.c. ±5 percent
+28 v.d.c. ±10 percent, -15 percent
- 20 v.d.c. ±10 percent
- 6.8 v.d.c. ±10 percent
+5.1 v.d.c. ±5 percent
- 5.0 v.d.c. ±6 percent
3.2 v.a.c. ±10 percent

NOTE: No convenience outlets are provided on the 280.

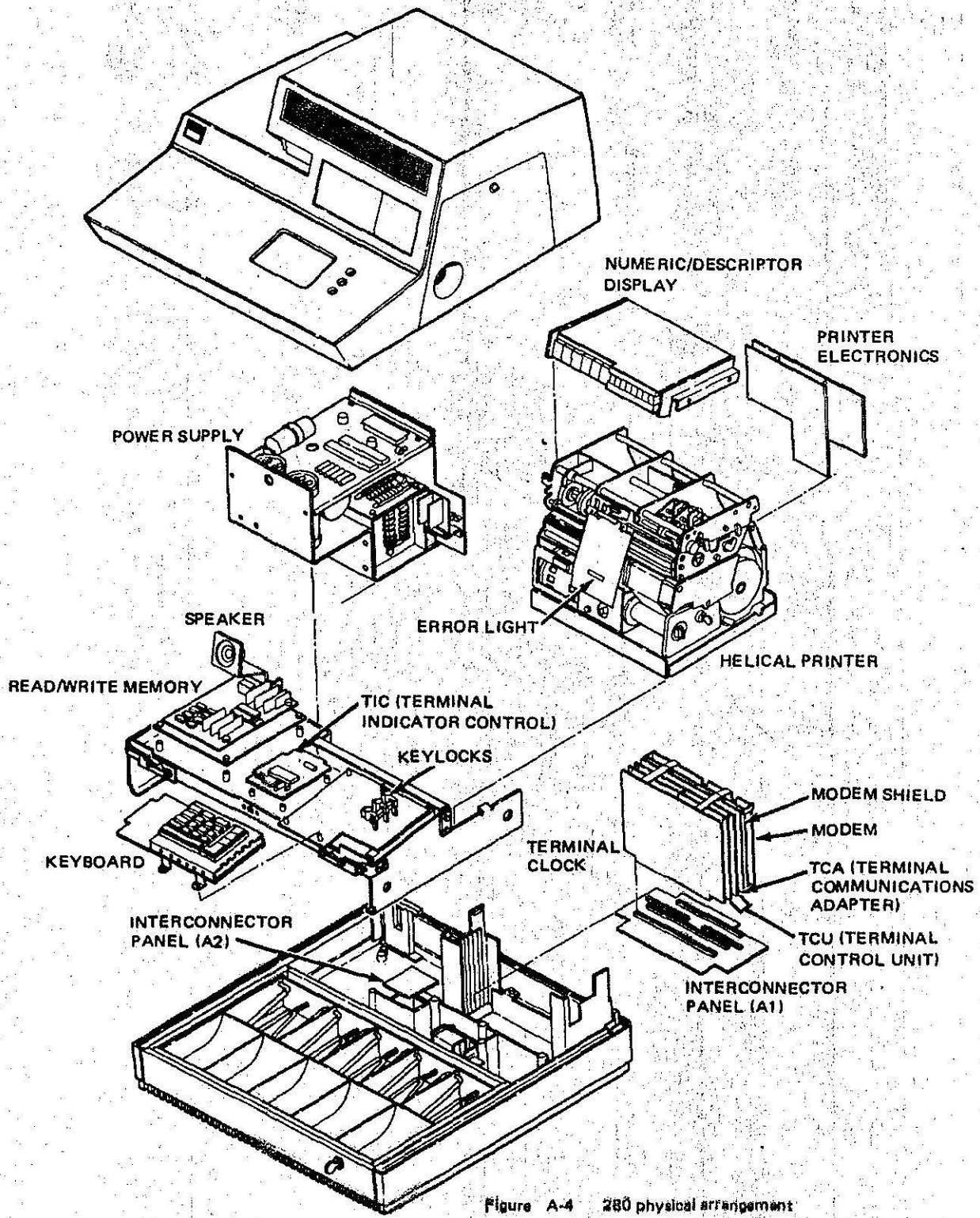


Figure A-4 280 physical arrangement

SYSTEM CONFIGURATIONS WITH 723

Data collection with a 723 is presently available in three configuration levels. The three levels are described in the following paragraphs.

LEVEL I – DATA COLLECTION

The Level I Data Collection configuration is the basic system which provides transaction processing at the point of sale and transaction data collecting on a magnetic tape unit for further processing at a central processing facility. This configuration consists of several 280 Retail Terminals which individually transfer transaction data to a 723 Data Collector over in-house, customer owned, data communication lines (refer to figure A-5).

At the end of the day, or when a reel of magnetic tape is fully recorded, the tape is removed from the 723 and sent to an information processing facility where transaction and inventory data may be processed.

LEVEL II – BATCH TRANSMISSION

The Level II Batch Transmission configuration performs the same functions as the Level I configuration and has the additional capability of providing after-hours transmission of the collected data to a central receiving facility. The Level I configuration is upgradable to Level II by modifying the 723. Figure A-6 depicts a typical Level II system configuration.

This configuration, like Level I, consists of up to 48 280's per 723. The difference in operation is that at the completion of a business day the data collected on the 723 tape may be transferred over a dial-up data communication network to a central processing facility.

LEVEL III – CREDIT AUTHORIZATION

The Level III Credit Authorization configuration performs the same functions as the Level I and Level II system configurations and has the additional capability of performing online credit or check authorization from the 280 through the 723 to a central credit file. This capability permits the user to check the credit status of an individual making a charge purchase directly from the 280 at the time of sale. A typical Level III system configuration is shown in figure A-7.

In a Level III configuration, transaction data is collected and written on tape at the 723 in the same manner as in Level I and II systems. When credit authorization is desired on a particular transaction the 280 transfers an account number and the total amount of the charge along with a special signal to distinguish it from normal transaction data to the 723. The 723 transfers the account number over leased (telephone company) data communication lines to a Credit Authorization File subsystem where the account number is checked for specified credit limits. The credit authorization file returns the response of the credit check through the 723 to the original 280.

After-hours batch transmission may be included in this system configuration by having a central receiving facility as a part of the system.

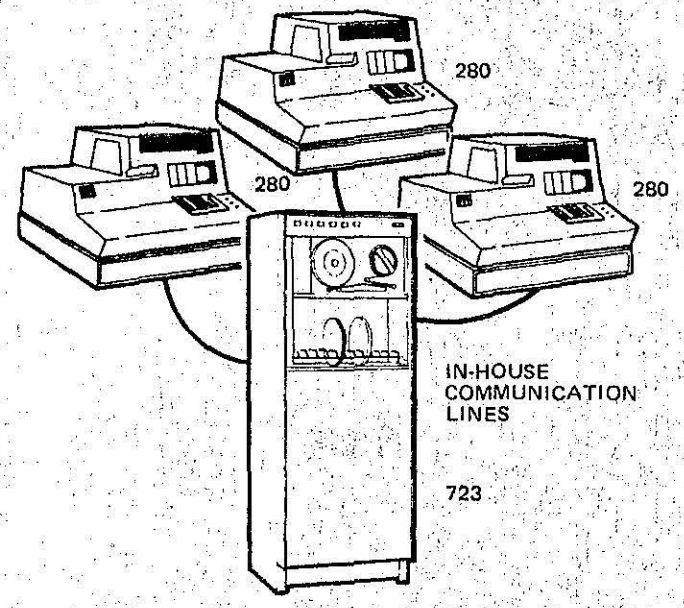


Figure A-5 Level I data collection system

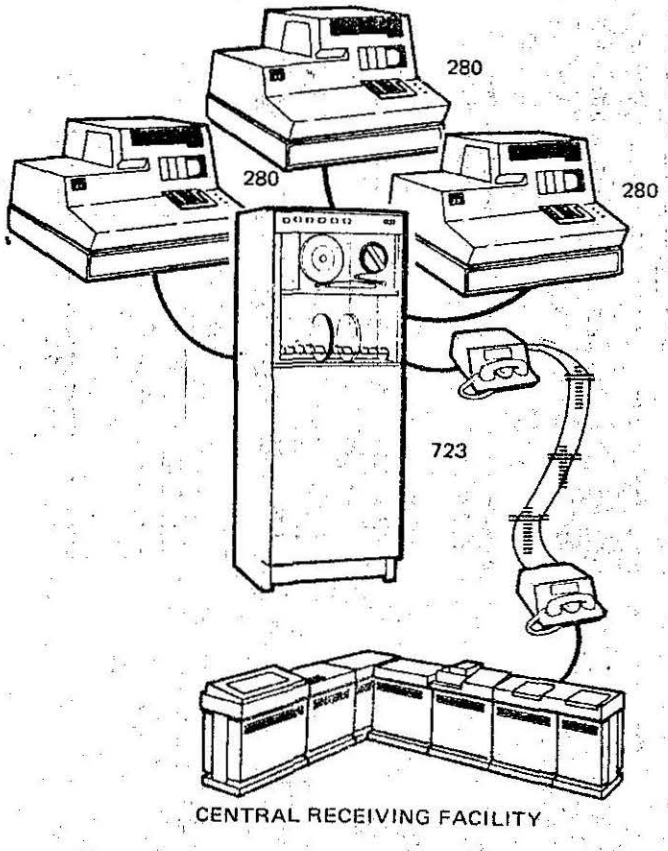


Figure A-6 Level II batch transmission system

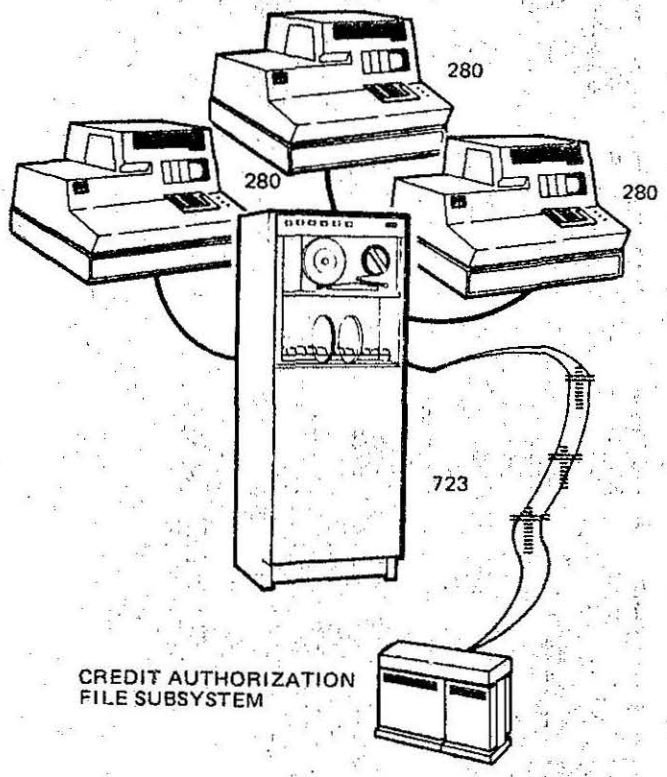


Figure A-7 Level III credit authorization system (typical)

SECTION B
GENERAL DESCRIPTION

INTRODUCTION

The 280 Retail Terminal provides functional capabilities that are similar to those provided by a conventional cash register; however, many of the manual operations required by a conventional cash register are simplified or performed automatically in the 280. The capabilities, characteristics, and capacities of the 280 are described in this Section.

TRANSACTION TYPES

The 280 is capable of performing various types of transactions which are required in department, discount, or specialty store applications. Following is a description of each transaction type.

OPENING

The opening transaction is used as the initial operation of the day and may also be performed when changing operators. This transaction records the date and the opening operator's identification number. The two types of opening are cashier opening and clerk opening.

A cashier opening transaction is generally performed when a single operator is using the 280 throughout the day. Once a cashier opening has been performed, the operator is not required to enter an identification number at the beginning of each merchandise transaction. This is permitted because the 280 stores the identification number entered during a cashier opening for use during merchandise transactions.

A clerk opening transaction is usually performed at the beginning of the day when several operators are using the 280 interchangeably. The operator identification number must be entered during each merchandise transaction following a clerk opening.

CASH SALE

Take=1 Send=2

Cash sale transactions are used for merchandise paid for in cash by the customer at the time of sale. Cash sale transactions are usually designated as either cash-take or cash-send.

Cash-take transactions are used when the purchaser takes the merchandise with him after completion of the sale. The transaction data is recorded on a transaction journal and used for hard-copy auditing purposes by store management. A sales slip or customer receipt is issued to the purchaser for his record of the transaction. A sales slip is generally used when the merchandise is to be picked up in another area of the store, for example, dock pick-up. The use of a sales slip, customer receipt, or both is programmable in the 280.

Cash-send transactions are used when the purchaser pays for the merchandise in cash and desires to have it delivered to a specified address. Sales slip use is normally programmed to be mandatory for this type of transaction; however, the media counter is not normally programmed to be incremented since this type of slip is not required for balancing.

CHARGE SALE

Charge sale transactions are used when the sale of merchandise is charged to a store controlled credit account by the purchaser. Store controlled credit accounts are designated as 30-day charge, revolving charge, installment purchase, etc. Slip usage, though programmable, is usually mandatory for charge sale transactions. These transactions require the entry of the purchaser's charge account number. During a charge sale transaction, a partial cash payment may be made with the result that the remaining amount of the sale is charged to the purchaser's account.

BANK CHARGE SALE

Bank charge sale transactions are similar to charge sale transactions since the sale amount is charged to the purchaser's account. The differences are that the purchaser's credit account is controlled by the bank issuing his credit card instead of being store controlled and that no account number entry is required by the 280.

COD SALE

The COD (cash-on-delivery) sale transaction is used for merchandise which is to be paid for in cash when delivered to a specified address. A deposit or partial cash payment may be required by the store at the time of sale.

LAYAWAY SALE

The layaway sale is used when the merchandise is to be held by the store until the full purchase amount has been paid. The store generally requires that a deposit be made at the time of sale. The deposit amount may be paid in cash or charged to the purchaser's store-controlled credit account.

NO SALE

The no sale transaction is used by the operator to gain access to the cash drawer contents.

CASH RETURN

The cash return transaction is used to provide a cash refund for previously purchased merchandise which is returned to the store.

CHARGE RETURN

The charge return transaction is used to provide a credit to the customer's store controlled credit account when merchandise is returned. This transaction requires the entry of the customer's account number to ensure proper crediting during the update performed at the central processing facility.

BANK CHARGE RETURN 26

The bank charge return transaction is used to provide a credit to the customer's bank card charge account for returned merchandise. No account number entry is required by the 280 on this transaction; however, a bank card credit slip must be completed by the operator and returned to the issuing bank to ensure that proper credit is applied to the customer's account.

CASH EXCHANGE 30

The cash exchange transaction is treated as a cash return and cash sale in the same transaction. During a cash exchange transaction, the merchandise data for the returned items must be entered before the sale items. Completion of this transaction may result in a cash sale, a cash refund, or an even exchange. When the value of the sale items exceeds that of the returned items, a cash sale results requiring the purchaser to pay the difference in cash. When the value of the returned items exceeds that of the sale items, a cash refund results requiring the store to refund the cash difference. If the value of the sale and returned items is equal, an even exchange results and no cash transfer is required.

CHARGE EXCHANGE 31

The charge exchange transaction incorporates charge return and charge sale operations within the same transaction. A charge exchange is similar to a cash exchange except that monetary differences incurred are either charged to or credited to the purchaser's store-controlled credit account. This transaction requires the entry of the purchaser's account number.

BANK CHARGE EXCHANGE 36

The bank charge exchange transaction incorporates bank charge return and bank charge sale operations within the same transaction. A bank charge exchange is similar to a charge exchange except that no account number entry is required.

RECEIVE ON ACCOUNT

The receive on account transaction is used to make a payment to an account. Entry of deposit amount, amount tendered, and account number is required. The terminal performs the normal credit procedure and displays change due.

VOID

This transaction is the only method for voiding another transaction. Entry of an identification number, if the operator is a clerk, and the transaction number of the transaction to be voided is required. The 280 prints the information entered followed by mnemonics, as programmed, such as VOID.

RE-ENTRY

The re-entry transaction is used to permit the operator to re-enter transactions which have been performed but not recorded on tape at the 723 or 761 due to the 280 being offline. The transactions performed while offline are identified on the journal tape with a code of ///// (code) NT /////. The re-entry transaction prepares the 280 to accept transactions to be re-entered without alternating internal totals. Transactions may be re-entered at any 280 currently online. This procedure is usually performed by supervisory store personnel.

CLOSING 44

The closing transaction is used to read or reset the 280 totals at the end of the business day. During the closing transaction, a cash count of the cash drawer contents may be calculated by indexing the quantity times the denomination of coins, paper currency, and checks contained in the drawer. The total of the cash count is displayed and printed. The sales and returns totals are printed but not displayed. A cash total reflecting the cash receipts for the day may also be printed during a closing transaction. The printing of the cash total is optional through programming. This transaction resets the media counter when the totals are reset. The sales total may be programmed to be nonresettable.

PROGRAMMING

The programming sequence is used to provide access to the contents of the read/write memory. When using this mode the programmer is able to alter the contents of the memory to effect changes in operating sequences and stored constants.

GENERAL CALCULATIONS

The 280 is capable of performing internal calculations on portions of the merchandise data entered by the operator. These calculations are described in the following:

ARITHMETIC CALCULATIONS

The 280 performs the arithmetic calculations required for addition, subtraction and multiplication. Addition of two numeric fields of up to 10 digits each can be performed. An eight digit (maximum) numeric field can be subtracted from a numeric field of up to 10 digits. Multiplication can be performed on a seven digit field but the multiplier cannot exceed four digits. Division is performed internally but is not available through the keyboard.

TAX CALCULATION

The 280 provides the options relative to the use and calculation of sales tax. Any one of the following tax options may be selected through programming to meet the application requirements of a particular store.

NO TAX OPTION

The No Tax Option is used when no sales tax is required for purchased merchandise. This option causes the 280 to automatically bypass the tax computation sequence.

AUTOMATIC TAX ONLY OPTION (ATO)

This option is used when it is desirable to have the 280 automatically calculate the sales tax without requiring operator intervention. The sales tax is computed on the purchase amount of the taxable items being sold. An internally stored tax percentage is used to calculate the tax amount due.

MANUAL TAX ENTRY ONLY OPTION (MTO)

This option is used when the store wishes to have the operator perform all tax calculation functions. When using this option, the 280 requires a tax amount or tax percent entry. Use of amount or percent entry is programmable. If the purchase is so small that no tax is required, the operator must enter "0". A tax code of up to 13 digits may be indexed before the tax percent or tax amount if the /FOR key is pressed to separate the two data fields.

MANUAL AND AUTOMATIC TAX OPTION (M AND A TAX)

This option is used where two tax calculations must be performed separately. In this option the operator enters one tax (amount or percent as programmed) and the 280 calculates the second tax amount using the internally stored tax percentage. During entry of the manual tax, a tax code may be entered in the same manner as in the MTO option.

MANUAL OR AUTOMATIC TAX OPTION (M OR A TAX)

This option provides the operator with the choice of either manually entering the tax (amount or percent as programmed) or allowing the 280 to calculate the tax automatically. The operator may bypass the manual entry by pressing the ENTER key instead of entering a tax amount or percent. Bypassing the manual tax entry causes the 280 to perform the automatic tax calculation. During entry of the manual tax, a tax code may be entered in the same manner as in the MTO option.

MANUAL AND AUTOMATIC OR AUTOMATIC TAX ONLY OPTION (M AND A OR ATO)

This option permits manual tax to be entered optionally with automatic tax always being calculated. The operation of this option is similar to that of M and A TAX except that manual tax data entry is not required.

DISCOUNT CALCULATION

The 280 provides automatic calculation of discount amounts. The unit is capable of calculating discounts using percentages of from 00.01 to 99.99 percent. The discount percent is stored internally in the read/write memory. If the operator wishes to perform a discount calculation using a percentage different from that stored internally, the percent must be entered through the keyboard. Entering a percent through the keyboard overrides the stored percentage. The terminal may be programmed to permit two digit (1 to 99) or four digit (00.01 to 99.99) percent entries through the keyboard. The percent is printed along with the discount amount. If the MODIFY TAX key is not pressed, the discount is calculated on the itemizer indicated by the state of the nonmerchandise selective itemizer (SI) programming bit (refer to the Programming section). If the MODIFY TAX key is pressed, the discount is calculated on the other itemizer and the # mnemonic is printed. A programmable control bit may be set in the read/write memory to cause the 280 to calculate a discount on both itemizers. With this bit set, the MODIFY TAX key is ignored during discount sequences and the # mnemonic is printed. Programming for discount on both itemizers is not permitted for models using the 761 for data collection. All discount amounts are subtracted from the same itemizer on which they have been calculated. A discount may be performed at any time prior to a deposit entry. Once a deposit has been made, discount is locked out. The terminal can be programmed to allow only one discount or more than one discount.

EXTENDED ITEM PRICE CALCULATION

The terminal provides three operator choices when entering item price. It permits item extension (multiplication), no item extension (package price), and single item price entries. Each choice is described in the following.

Item Extenion — When there is more than one identical item and item extension is desired, the operator indexes the quantity of items, presses the X (times) key, and enters the price of a single item. The terminal performs the extension (multiplication), prints, and displays the quantity and extended price (product of multiplication). Item extension for color coded tag reading is also available. The operator simply indexes a quantity, presses the X key and reads the tag.

Package Price — When no item extension is desired on entry of more than one identical item, the operator enters the quantity of items, presses the /FOR key, and enters the package price. For example, "three items for $1.00," the $1.00 is the package price. The terminal does not perform multiplication, but does print and display the quantity along with the package price.

Single Item Entry — When there is only one item, the operator enters the price of the item only. The terminal prints a quantity of one and the item price.

NOTE: The terminal may be programmed to permit two digit (1 to 99) or four digit (00.01 to 99.99) quantity entries.

CHANGE CALCULATION

The terminal automatically calculates the amount of change due the customer. The operator must enter an amount tendered equal to or greater than the required amount. If the amount tendered is less than the total cash amount, the terminal indicates an error condition and displays the amount due. One exception to this occurs if the terminal is programmed to allow multiple checks tendered. In this case a check may be tendered for less than the amount required. The terminal subtracts the amount of the check from the amount required. The difference is then displayed as the new amount required. Checks may continue to be tendered until the total amount tendered is equal to or more than the original amount required or a cash tendered entry is made. Only one cash tendered entry can be made and it must be equal to or more than the amount remaining. On an even exchange where the amount tendered is zero, the

operator enters a zero. The 280 may be programmed to bypass the amount entry when the amount tendered is equal to the amount required. In this mode, the ENTER key is pressed without indexing an amount and the 280 proceeds as if the exact amount required was tendered. If change calculation is not desired, the amount tendered sequence may be bypassed according to program.

CASH COUNT

The terminal provides the operator with the option of performing a cash count of the drawer contents during a closing operation. The operator is required to count the quantity of each denomination of coins or currency in the drawer. The operator then enters a quantity not to exceed two digits, presses the X (times) key, and enters the face value of the denomination of money being counted. For example, if 20 dimes are being counted, he enters the number of dimes (20), presses the X key, and then enters the denomination value of the dime (10). The terminal prints and displays the extended figure, in this case $2.00. This procedure is repeated for each denomination counted. When counting bank checks the operator enters the amount of the check only. The terminal provides a running total of cash counted.

CHECK DIGIT VERIFICATION (CDV)

The terminal provides a means of determining the validity of data in selected fields. The two methods of CDV checking available through programming are the *product addition* method and the *product digit addition* method.

The product addition method involves multiplying each digit in a data field by a predetermined weight (multiplier), then adding all the products to form a sum. The sum is then divided by the modulus, and if the number is valid, the remainder is zero.

The product digit addition method is the same as the product addition method with the exception that the digits of each product are added to form one sum.

For example, if the multiplication of the weight by the digit in the data field results in a product greater than 9, the two digits of the product are added together. If a weight of 7 is assigned to a data digit of 6, the product is 42 and the sum of the digits in the product is 6. The 6 is used in the addition to form the sum of all the products in the product digit addition method, and the 42 is used in the product addition method.

The terminal stores two sets of CDV weights, each set having up to 13 digits. Individual weights may have a value of from 0 through 9. The weights are assigned from the least significant digit position to the most significant digit position of a particular data field. A weight of zero indicates that the corresponding digit in the data field is not to be used during the calculation. The CDV check digit may be placed anywhere within the data field to be checked. Two modulus digits, 10 and 11, are also stored by the terminal.

The method of selecting the set of weights, the modulus, and the calculation method is contained in the Programming section.

ITEMIZERS

The terminal provides two 8-digit itemizers: a taxable itemizer and a nontaxable itemizer. The sum of these two itemizers plus the deposit amount, if any, may be displayed by pressing the SUBTOTAL key at any time during a transaction. The two itemizers are added together after the tax calculation is completed and before the total sale or credit amount is displayed. The sum of the two itemizers cannot exceed positive $899,999.99 or negative $100,000.00 without causing errors.

TOTALS

The 280 contains three permanent 10-digit totals, namely sales, returns, and cash. The sales and returns totals contain an accumulation of the net transaction amounts. The sales total accumulates all transaction amounts in favor of the store and is programmable through a hardware change to be either resettable or nonresettable during the closing transaction. The returns total accumulates all transaction amounts in favor of the customer and is resettable during a closing transaction. The cash total is incremented when cash is paid in favor of the store from either cash sales or cash deposits. The cash total is programmable through a hardware change to be decremented when cash is paid out of the drawer. If the cash total is programmed not to decrement, a paid out amount does not alter it. The cash total is always resettable during a closing transaction. The ability of the operator to read the cash total during a closing transaction is programmable through a hardware change. The hardware programming changes previously mentioned refer to changing the direction of clips on the TCU logic board which is referred to as terminal address character programming.

The totals are incremented at the completion of sale, return, exchange, layaway, and cash-on-delivery (COD) transactions, and when a transaction is terminated through use of the transaction abort sequence. The sales and returns totals can maintain only positive amounts and recycle through zero when $99,999,999.99 is exceeded.

The amount limit for the cash total is $89,999,999.99 positive and $10,000,000.00 negative. These limits cannot be exceeded without causing errors. The totals are not accessible to the operator for incrementing during any transaction including programming whether in the normal or diagnostic mode. The totals may be read or reset during a closing transaction by use of the proper key and in accordance with the before-mentioned programmable options.

COUNTERS

The 280 contains two permanent 4 digit counters, which are the transaction counter and the media counter. The transaction counter is incremented by one each transaction. The media counter is incremented only on those transactions programmed to increment it (refer to the Programming section). The media counter cannot be programmed to increment during any of the series 40 transaction types which include opening, closing, re-entry, and programming.

The transaction number cannot be reset during a closing

transaction. The media counter may be reset during a closing transaction.

Both counters recycle through zero when the number 9999 is exceeded.

CREDIT AUTHORIZATION

The 280, when data collecting with a 723, has the capability of referring store-controlled credit account numbers to a central credit file for verification of credit status. This credit authorization capability allows the operator to check the credit status of a customer purchasing merchandise. The recognition of the credit authorization feature by the 280 is programmable. On-line credit authorization is not available with 761 data collection.

With credit authorization programmed to be in effect and with a central credit file in operation and capable of communicating with the 280, the account number entered by the operator is sent to the central credit file for verification. When communicating with a central credit file, the status of the account is sent to the 280 along with miscellaneous data such as a phone number for the operator to call. Both the status code and the miscellaneous data are displayed, but only the status code is printed.

When credit authorization is programmed to be in effect and the central credit file or communication lines are down or when the credit authorization subsystem is not installed, the 280 may perform a modified form of authorization internally. A floor limit is contained in the read/write memory. The floor limit may be programmed to permit charged amounts not exceeding the limit to be regarded as good. Charged amounts exceeding the floor limit require local authorization. If, for example, a customer charges fifty dollars worth of merchandise and the floor limit is twenty dollars, the 280 displays a code to the operator indicating that authorization is required. The operator may then consult with management for local authorization.

The minimum floor limit programmed into the read/write memory provides the base amount which must be exceeded before any credit authorization sequence is performed when online.

CHECK AUTHORIZATION

The 280, when data collecting with a 723, provides a means of authorizing checks tendered during merchandise transactions. When using the 761 for data collection, check authorization is not available. The check authorization feature is similar to credit authorization since a central file may be accessed to determine check account number status. Check authorization parameters are also fully programmable. When the amount tendered descriptor is illuminated and payment by check is desired, the operator may enter the check account number, press the /FOR key, and enter the amount of the check. Entering data then pressing the /FOR key identifies the amount tendered as a payment by check and indicates that check authorization is requested when the feature has been programmed to be in effect and the central file is operating. If access to the central file is not desired, the operator presses the /FOR key and enters the amount of the check.

A transaction type code of 01 is sent with the authorization request message to the central file to distinguish the number sent to the central file as a check account number and not a credit account number.

OFFLINE CAPABILITIES

The 280 is capable of performing all merchandise transactions when the data collection system is down. When in the offline mode, the 280 maintains its print capabilities and totals. The 280 resumes online status automatically when the data collection system is back in operation.

PRINTING

The helical printer provides the printed records of all transactions. The printer has three 30 column print stations with full alphanumeric printing in each station. The alphanumeric capability provides all alphabetic and numeric characters plus the symbols #; ½; ,; -; .; and /. A typewheel with Japanese characters is also available. The three print stations are slip, receipt and journal. Printing occurs on one, two, three, or no print stations, depending on how the programmable print options are used. In the programming mode printing occurs on the receipt only. The helical printer is an output module which accepts information to be printed from the TCU module.

SLIP PRINT STATION

The slip print station is located on the left side of the printer and is joined to the cabinet slip table. An access door is provided to permit slip stop adjustment and ink roll replacement. Following is a description of slip parameters.

SLIP ENFORCEMENT

The use of the slip is programmably enforced by transaction type. Enforcement is evidenced by the INSERT SLIP message being illuminated and the 280 hanging up with the ERROR light illuminated. To clear the condition the operator must insert a slip and press the CLEAR key to resume the transaction.

RECEIPT OVERRIDE

If the slip is inserted before the first line has printed, the slip may override the receipt according to programming. Receipt override may occur on any transaction unless the transaction is programmed for validation and the "no slip" bit is set.

VALIDATION PRINTING

Validation printing is programmably enforced by transaction type. If a transaction is programmed for validation printing, the following terminal action occurs. After the footer is printed and check endorsed if required, the insert slip descriptor light is turned on. The operator then inserts the media to be validated and presses the CLEAR key. The terminal prints three lines on the media: (1) header, (2) account number, if any, and (3) footer. If a slip is enforced for the transaction, the header will not be printed during validation.

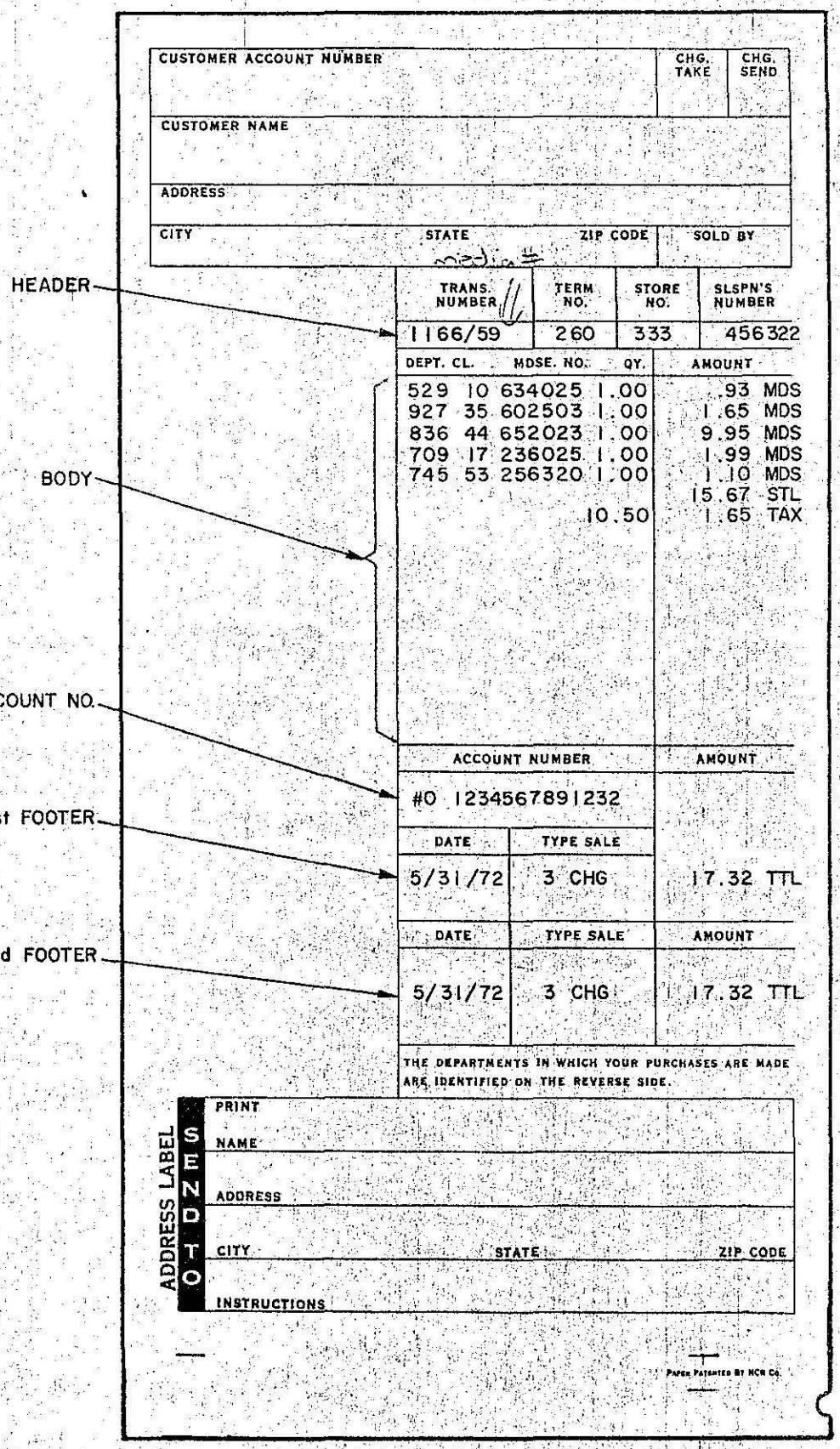


Figure B-1 Slip printout

SLIP LAYOUT

A typical slip layout is depicted in figure B-1. The first line printed on a slip is the header line which may contain any four of the following data fields.

- Transaction and media number
- Terminal number
- Store number
- Operator identification number
- Date
- Transaction type code number and mnemonic

The number of lines skipped between the header and the first merchandise print line is programmable from 1 to 16 lines. The merchandise print lines consist of a programmable number of numeric fields. These fields may consist of department number, class number, merchandise number *(SKU), miscellaneous data, quantity, extended price, and identifying mnemonic. When more than one line is required to print the data, the 280 can be programmed to print up to one line per data field. The columns in which each field is printed are also programmable. The nonmerchandise data is printed according to format variations described in the *Programming* section.

The body of the slip consists of merchandise and nonmerchandise print lines. A maximum of 127 lines may be programmed to be printed in the body. The form used must permit enough space for tax, amount tendered, and change due to be printed because once the TOTAL key is pressed, the 280 finishes the transaction without requiring another slip.

The number of lines skipped between the body and the account number is programmable from 0 to 15. The lateral position of the account number is also programmable and is preceded by the credit authorization code.

The number of lines skipped between the account number and the first footer is programmable from 0 to 15. The content of the footer is programmable and contains the amount of the sale and any three of the following data fields.

- Transaction and media number
- Terminal number
- Store number
- Operator identification number
- Date
- Transaction type code number and mnemonic

The transaction net total is printed in the footer. The footer may be optionally repeated on the address label on all transactions using the slip. The number of lines skipped between the two footers is programmable from 0 to 14.

SLIP OVERFLOW

The 280 determines when the slip is full by counting the number of lines printed. When a slip is full, the 280 releases the slip and illuminates the INSERT SLIP descriptor. The header is printed on the new slip and the 280 is ready to proceed with the transaction. The operator has the option of aborting the transaction or totaling out instead of inserting a new slip. The pressing of the TOTAL key causes the transaction to be completed without inserting a new slip.

SLIP PAPER REQUIREMENTS

The printer is capable of printing on either single or multiple part forms using NCR carbonless parts or carbon interleaved parts. The lightest single part form that may be used is 15 pound; the heaviest is 155 pound. The printer can print on two, three, or four part forms. The multiple part forms used must be bound at the top. The heaviest accumulated weight of all parts and carbons must not exceed 155 pounds. A 12 pound part is the lightest that can be used in multiple part forms but carbons may be lighter.

RECEIPT PRINT STATION

The receipt print station is located at the upper right-hand side of the printer and is accessed through the righthand 280 cabinet door. The receipt is automatically loaded and passes through an opening in the front of the 280 cabinet. The receipt print format has the same content as the slip. The line spacing is as shown in figure B-2 with an electro (logo type) being printed at the top. A low receipt paper supply is indicated by colored stripes on the receipt paper.

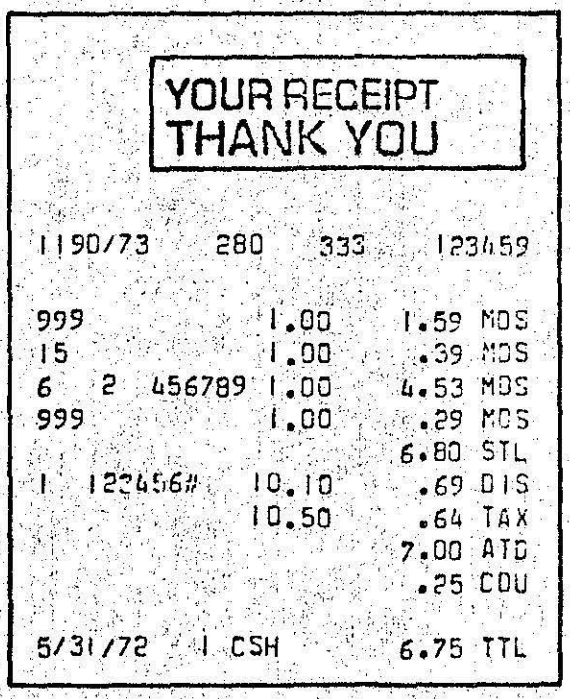


Figure B-2 Receipt printout

JOURNAL PRINT STATION

The journal print station is located at the lower right-hand side of the printer and is accessable through the same cabinet door as the receipt printer. The journal paper is contained in a cassette mechanism which is removable from the 280. All data input through the keyboard is printed on the journal. The journal paper is visible to the operator through a window in the cabinet front. A snap back mechanism permits the operator to view the last line printed. The 280 checks for journal low status or missing cassette at the end of each transaction, during upsequence, and immediately before printing the header. If the journal tape supply is low or the cassette missing, the 280 illuminates the JOURNAL LOW descriptor and prevents initiating a new transaction until corrective action has been taken. If the cassette is removed prior to starting a transaction, that transaction cannot be completed until the cassette has been replaced. Approximately 5 feet of paper remains on the roll when the JOURNAL LOW descriptor is illuminated. A subtotal is not printed on the journal. Journal print layout is depicted in figure B-3. The printing occurs from bottom to top on the journal.

```
 ///// 4NT /////          918.96
5/31/72    1 CSH            6.75 TTL
                             .25 COU
                            7.00 ATD
                   10.50     .64 TAX
1   123456#        10.10     .69 DIS
                             6.80 STL
999                 1.00     .29 MDS
6   2   456789      1.00    4.53 MDS
15                  1.00     .39 MDS
999                 1.00    1.59 MDS
1190/73     280     333     123459
```

Figure B-3 Journal printout

PRINTER MNEMONICS

The printer prints mnemonics for the various types of entries. The mnemonics and the starting print column of the mnemonics are programmable. The # symbol, used in tax exception, discount ID, discount amount derived from both itemizers, and program mode in writing to core, is not programmable. The print column for the # symbol is programmable except in the program mode when writing to core and after discount ID. Other symbols such as the slash (/) and the decimal point (.) are not programmable and are printed automatically within the field of data (e.g., the slash in date field). Following is a list of 30 sets of mnemonics that are programmable:

Mnemonic Number	Mnemonic (English)	Identifier
01	MDS	Merchandise Item
02	RTN	Return Item
03	ERR	Error, Item back out
04	STL	Subtotal
05	DIS	Discount
06	FEE	Fee
07	MSC	Miscellaneous Credit
08	DEP	Deposit
09	TAX	Tax
10	TTL	Total
11	CRT	Credit
12	ATD	Amount Tendered
13	CDU	Change Due
14	CHG	Charge Transaction
15	CSH	Cash Transaction
16	COD	Collect on Delivery Trans.
17	LWY	Layaway Transaction
18	VOD	Void Transaction
19	ROA	Received on Account
20	CSH	Total Cash
21	RST	Total Reset
22	CS-	Negative Total Cash
23	RTN	Total Returns
24	SLE	Total Sales
25	CNT	Cash Count (on closing)
26	VOID	VOID (of a transaction)
27	DIAG	Diagnostic Mode
28	CTD	Check Tendered
29	///	Off-Line Indication on closing transaction
30	NT	Transaction Not Transmitted (indication on Journal)

COLOR CODED TAGS

The 280 equipped with a 785 Wand Reader accepts data from color bar encoded tags having merchandise information, ID numbers, or account numbers encoded on them. Each tag contains either one or two blocks of data with each block containing one or more fields. The maximum number of data characters acceptable on a one block tag is 28; 56 characters are acceptable on a two block tag.

TAG DATA FORMAT

Merchandise tags may be made up of several data field formats while identification and account number tags are limited to single data fields. Refer to table B-1.

NOTE: The data field contents and format codes assigned for tag types 1-5 as shown in table B-1 are for illustration purposes only. The actual configurations are determined by customer requirements.

FORMAT CODE

The first character sent to the 280 from the 785 is the format code (see table B-1). Format codes 6 and 7 are dedicated for account and identification number tags respectively. All other format codes are not used by the 280 logic but are transferred along with the data message to the data collector.

Table B-1 Tag types

Tag Type	Data Field	Format Code
1	Department No. Class Price	1
2	Department No. Class Merchandise No. (SKU) Season (Transparent) Price	2
3	Block 1: Vendor No. (Transparent) Style No. (Transparent) Color No. (Transparent) Size (Transparent)	3
	Block 2: Department No. Class Season (Transparent) Price	
4 *	Dept. Class Season (Transparent) Price	None
5	Block 1: Vendor No. (Transparent) Style No. (Transparent) Color No. (Transparent) Size (Transparent)	4
	Block 2: Department No. Price	
6	Account No.	6
7	Identification No.	7

* Tag type 4 is an overlay tag for the second field of a type 3 or 5 tag.

DATA SEPARATOR CODE

One of four unique separators is used to denote the end of one field of data and the beginning of the next. These separator codes and their use are shown in table B-2. Each data field is followed by its separator code. No separators are included on identification or account number tags.

Table B-2 Data separator codes (tags)

Data Field	Code (Bit Configuration)
Department No.	C (1100)
Class No.	D (1101)
Merchandise No.	E (1110)
Transparent Data	F (1111)

PRICE FIELD

The price field is always the last data field on merchandise tags. If an end of tag status occurs immediately following a data separator, an empty price field is indicated.

MERCHANDISE DATA FIELDS

A single merchandise field may not exceed 13 digits, and the actual length of field should not exceed the maximum field size programmed for that field. The price field, for example, must not exceed 7 digits. Leading zeros in all fields are ignored by the 280. An error does not occur when the maximum field size programmed in the 280 is exceeded, except for the price field. Maximum field size limitations are placed on identification and account number tags by the 280.

PROCESSING DATA READ FROM A TAG

The first character sent to the terminal from each tag is the format character. This character, if from a merchandise tag, is transmitted at normal transmission time to the data collector for later use by the data processor. If the format character is from an identification or account number tag, it is not transmitted but is used by the terminal to check proper tag type entry. The 785 sends the format character first, regardless of the direction in which the tag is read.

Following receipt of the format character, each data field is processed upon receipt of its respective separator. Fields followed by separators C, D, or E are processed and printed in the same manner as if entered through the keyboard.

Transparent data fields are followed by the separator, F, and may optionally be printed. This option is provided in the programming of the 280. Transparent data is printed on a single line with each field being separated by a space. No check for print buffer overflow is made for transparent data. If overflow occurs, the overflow data is put into the low order end of the print buffer (column 1) cancelling previously loaded data. Two print cycles occur when the 280 is programmed to print transparent data. During the first print cycle, transparent data is searched for and printed. During the second print cycle the department, class, merchandise, and quantity/price data is printed.

All data accepted from the 785 is transferred to the data collect buffer except the identification and account number format codes. The data separators are stored in the data collect buffer as unit separators (US).

POSSIBLE TO PRINT ALPHA CHARACTER ON 74?
TWO x 4 BIT CHARACTERS TWO FIELDS IN MAP A↔B AS FIRST FIELD 0→F AS DATA

A↔B	B↔A
0	0
↓	↓
F	F

SECTION C
OPERATION

INTRODUCTION

The 280 performs transactions as a result of interaction between the operator and the unit. The operator enters data and presses function keys which initiate 280 sequences. The 280 displays instructions for the operator as to the type of data to be entered, but the operator must be familiar with the various uses of function keys.

CONTROLS AND INDICATORS

KEYBOARD

The keyboard is the basic data entry module of the 280. It consists of 10 numeric keys (0-9) and 11 function keys. The numeric keys are arranged in a standard adding machine configuration (see figure C-1) with the touch tone configuration offered as an option (1, 2, and 3 at the top; 7, 8, and 9 at the bottom). The function keys, when pressed, cause particular actions to be performed within the 280. The uses of the 11 functions keys are described in the following paragraphs.

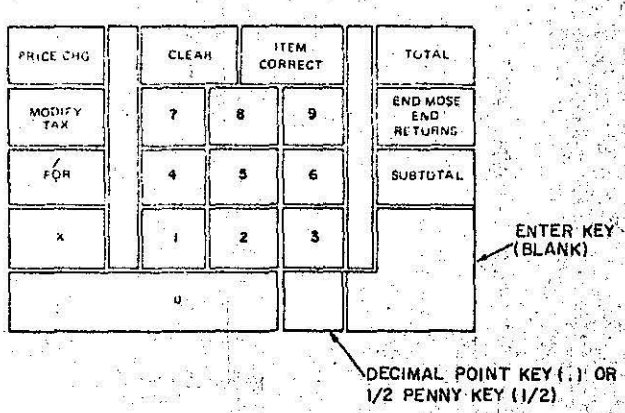


Figure C-1 Keyboard (adding machine configuration)

ENTER KEY

The ENTER key is used to put away data indexed from the numeric keys. The numeric data indexed is displayed and temporarily stored but is neither processed nor stored in the data collect buffer until the ENTER key is pressed.

END MDSE END RETURNS KEY

This key is used as a sequence control key during merchandise transactions to denote that the operator has completed the entry of sale items and there is a nonmerchandise entry to be made. It is also used during an exchange transaction to indicate the end of the entry of returned items and the beginning of the entry of sale items. The END MDSE END RETURNS key may also be used to return from the nonmerchandise sequence to the merchandise sequence.

TOTAL KEY

The TOTAL key is used during merchandise transactions to indicate the completion of sale item entries when no nonmerchandise information is to be entered. The TOTAL key is pressed upon completion of nonmerchandise entries to exit the nonmerchandise data entry sequence. When pressed immediately after pressing the ITEM CORRECT key during a merchandise transaction, the TOTAL key initiates a transaction abort sequence.

SUBTOTAL KEY

This key, pressed at any time during a transaction, causes the current total of the transaction to be displayed but not printed.

PRICE CHANGE KEY

The PRICE CHANGE key may be used when reading merchandise data with the 735 Wand Reader to indicate that the operator desires to enter the item price manually. When the PRICE CHANGE key is pressed prior to reading the tag, all information on the tag is read with the price information being ignored. The correct price must then be entered by the operator.

The PRICE CHANGE key is also used as an alternate sequence key. Pressing the PRICE CHANGE key at the first merchandise entry point will cause the 280 to change from the primary to the secondary sequence for that merchandise item entry only.

MODIFY TAX KEY

The MODIFY TAX key is used to qualify the tax status of merchandise or nonmerchandise item entries. If the 280 is programmed to normally add item amounts to the taxable itemizer, pressing the MODIFY TAX key causes the amount to be added to the nontaxable itemizer. When the 280 is programmed to normally add item amounts to the nontaxable itemizer, pressing the MODIFY TAX key causes the amount to be added to the taxable itemizer. If the 280 is programmed to calculate a discount on both itemizers, the MODIFY TAX key is ignored.

X KEY

The X (times) key is used to separate two numeric fields and instructs the terminal to multiply the content of one field by the content of the other as in 3 x $1.00. It is used for extending an item price during a merchandise transaction and multiplying the number of coins or bills by their denominations during a closing transaction. The X key is also used to initiate the miscellaneous data sequence when the 280 is at the first merchandise data entry point.

/FOR KEY

The / (slash) FOR key is used as a separator between numeric fields when no item extension is desired as in a package price of 3 for $1.00. It is used to separate the fields in the date entry as in 8/27/70. Pressing the /FOR key causes a dash (—) to be displayed. The /FOR key is used during the amount tendered sequence to indicate payment by check.

CLEAR KEY

The CLEAR key may be used to clear the data erroneously indexed on the keyboard, but not yet put away by the ENTER key. It may also function under program control as an item erase by cancelling all data entered on a current item, providing that the amount or percent of the item has not yet been entered.

Between merchandise data entry fields, pressing the CLEAR key once cancels all information entered for the current item and causes the terminal to return to the first merchandise entry point. If data has been indexed in a particular field (including the amount or percent fields) but not yet put away by the ENTER key, pressing the CLEAR key once cancels only the data for that particular field. A second depression of the CLEAR key is then required to cancel all information entered for the current item and return the terminal to the first merchandise entry point. The CLEAR key also clears the 280 when in an error condition.

ITEM CORRECT KEY

This key enables the operator to correct erroneous item information which has been previously entered completely. The process of correcting the erroneous information is referred to as item back-out.

The ITEM CORRECT key is also used to initiate a transaction abort when it is pressed immediately before the TOTAL key. The transaction abort results in the present transaction data being sent to the data collector incomplete. A void operation must be performed on the aborted transaction in order for the central processor to ignore the portions of the transaction recorded on tape.

DECIMAL POINT KEY

This key is used to indicate decimal amounts of quantity or percent. Up to four digits of quantity or percent may be entered (99.99). A maximum of two digits are allowed before the DECIMAL POINT key is pressed and a maximum of two digits after the key is pressed. Digits entered before the DECIMAL POINT key is pressed are treated as whole amounts of quantity or percent. Digits entered after the DECIMAL POINT key is pressed are treated as decimal amounts of quantity or percent.

1/2 PENNY KEY

For the 1/2 Penny model of the 280, the decimal point key is replaced by the 1/2 PENNY key. On the operators display the decimal point is located between the third and fourth positions from the right. If the 1/2 PENNY key is pressed during an amount entry, a 5 will be displayed in the right most position of the operator's display. If the 1/2 PENNY key is not pressed, the right most position will remain blank.

Although the DECIMAL POINT key does not exist on the 1/2 Penny model, entry of four digit quantities and four digit percentages is still available. When programmed for four digit quantities or percentages, the terminal assumes the last two digits entered to be decimal amounts.

OPERATOR DISPLAY

The operator display contains an 8-digit numeric section and a 24-message descriptor section which displays numeric amounts, operator instructions, and data descriptions. The numeric section of the display shows all numeric data entered through the keyboard and all price information entered from the 785 Wand Reader. It also displays transaction totals during closing and read/write memory contents during programming. The descriptor section of the display provides data entry instructions for the operator which, when illuminated, lead the operator through a particular transaction. It also contains data descriptors which describe the data being displayed on the numeric section. The operator display is shown in figure C-2.

MISCELLANEOUS COMPONENTS

The following paragraphs provide a brief description of the operator controls and indicators assigned to the miscellaneous components module.

The QUALIFICATION PANEL provides the operator with a list of transaction types and a qualification code number for each. When the panel is illuminated, the operator may enter the qualification code for the type of transaction desired. It is also illuminated prior to entering the type codes for fees and miscellaneous credits. A typical qualification panel layout is shown in figure C-3. Table C-2 shows all possible qualification codes and their resulting transactions.

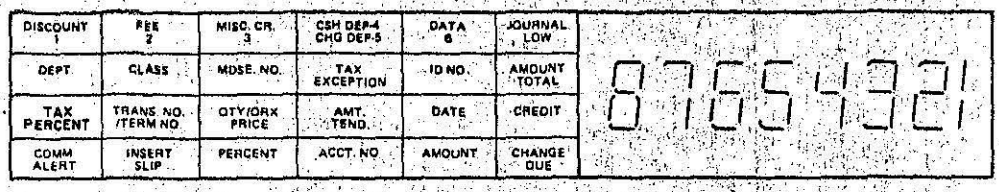


Figure C-2 Operator display

Cash	Take	1		Cash	20		Cashier Opening	42
	Send	2		Chg I	21		Clerk Opening	43
	Chg I	3		Chg II	22		Closing	44
	Chg II	4	Retn	Chg III	23		Re-entry	45
	Chg III	5		Bank Card I	26		Programming	47
Chg	Bank Card I	6		Bank Card II	27			
	Bank Card II	7		Cash	30			
COD		10		Chg I	31		Giftwrap	753
Layaway		11		Chg II	32		Postage	754
No Sale		12	Exch	Chg III	33	Fees	Delivery	755
Void		13		Bank Card I	36		COD	756
				Bank Card II	37		Layaway	757

Figure C-3 Sample qualification panel layout

The KEYLOCKS included in the 280 are ON/OFF, READ/RESET, PROGRAMMING, CASH DRAWER, and JOURNAL CASSETTE. These keylocks and their uses are described in the following.

The ON/OFF keylock is used as a power ON/OFF switch and is shown in figure C-4.

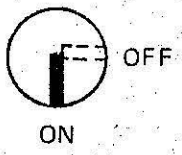


Figure C-4 On/off keylock

The READ/RESET keylock is used to read or reset the permanent totals. The read key, when inserted in this keylock, can be turned 90 degrees counterclockwise only and permits the permanent totals to be read. The reset key, when inserted in this keylock, can be turned either 90 degrees counterclockwise to read or 90 degrees clockwise to reset the permanent totals. The TIC monitors the position of this keylock. The key may be removed only in the normal position. Refer to figure C-5.

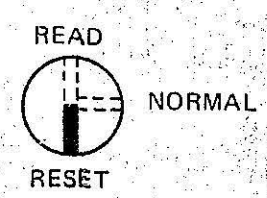


Figure C-5 Read/reset keylock

The CASH DRAWER keylock is used to permit manual cash drawer opening. It is a snap action keylock located on the front of the cash drawer. Turning the key 90 degrees clockwise from normal unlatches the drawer mechanism. Refer to figure C-6.

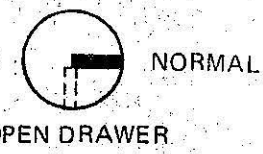


Figure C-6 Cash drawer keylock

The PROGRAMMING keylock is used to permit access to the read/write memory during programming sequences. It is also used when an error occurs during upsequence to permit access to the read/write memory. During diagnostic programming sequences performed by a Technical Service Representative, insertion of the programming key is not required. The TIC monitors the position of this keylok. Refer to figure C-7.

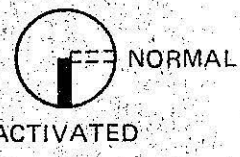


Figure C-7 Programming keylock

The JOURNAL CASSETTE keylock is used by authorized personnel to gain access to the journal tape. It is a two position keylock located on the journal cassette which when locked, prevents journal tape removal. Refer to figure C-8.

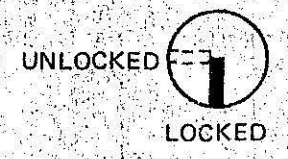


Figure C-8 Journal cassette keylock

The SPEAKER which is under control of the TIC, produces two electronic tones: a clear tone and a mixed tone. The clear tone is made up of an 1125 Hz tone. The mixed tone is made up of the 1125 Hz tone and a 3570 Hz tone blended together. Five functions are performed by these two tones. These functions and the sounds produced are listed below.

The keyboard click sounds each time a key is pressed on the keyboard. The click sound is made by the clear tone being turned ON for a short duration.

The cash drawer tone sounds each time the drawer is opened by the TIC. This tone replaces the bell sound normally heard on a cash register and is produced by the clear tone.

The error tone is sounded if there is an error in the input data to the terminal. The error tone sound is produced by mixed tone frequencies.

The data entry complete tone is sounded each time data is read correctly by the 785 Wand Reader and accepted by the terminal. This tone is made up of the clear tone sound.

The data entry incomplete tone sounds if the data being read from the 785 Wand Reader is either in error or incomplete. This tone is made up of the mixed tone sound.

The ERROR LIGHT is a red light located at the bottom of the qualification panel and when illuminated generally indicates that an error condition has been detected by the 280. It is controlled by the TIC and is usually illuminated at the same time the error tone sounds.

OPERATOR LEAD-THROUGH

The 280 guides the operator through transactions by providing lead-through instructions on the operator display module. The lead-through instructions indicate the particular type of information to be entered by the operator at the time the instruction is displayed. One instruction not presented by the operator display is the illumination of the qualification panel. The qualification panel is illuminated prior to the start of an operation to instruct the operator to enter one of the transaction type codes listed on the panel. This panel is also illuminated when a fee type code or miscellaneous credit type code should be entered. The sequence in which the lead-through instructions are presented to the operator is controlled by the firmware program of the TCU module and the application program of the read/write memory module. An example of the operator lead-through instructions presented during a typical cash sale transaction is illustrated in table C-1.

NOTE: Other series of instructions are used for other types of transactions. It should also be noted that there is no indication of which function key should be pressed. Function key use must be learned by the operator.

PRIMARY AND SECONDARY SEQUENCES

The terminal may be programmed to perform either a long or short sequence as the primary sequence. The long sequence leads the operator through 1st merchandise, 2nd merchandise, 3rd merchandise, miscellaneous data, and quantity X price entries. The short sequence includes only 1st merchandise and quantity X price entries. Pressing the PRICE CHANGE key when the terminal is at the first merchandise point causes the terminal to change from the primary to the secondary sequence for that transaction only. The terminal may also be programmed so that merchandise information (Department No. and quantity X price) are not transmitted to the data collector during a short sequence transaction. However, all other information on the transaction will be data collected.

POWERING UP

The power upsequence is initiated when the ON/OFF key is inserted and turned clockwise in its keylock. During the 280 upsequence the read/write memory constants and work areas are checked. A CDV check is performed on the stored constants and verified by the 280. During the CDV check phase, the ERROR light flashes ON and OFF. On completion of the CDV check, the 280 checks the work areas of the read/write memory by first writing into, then reading out, each location. The clear tone is sounded during this phase of upsequence. If the core does not check, the error light is turned on and the terminal becomes inoperative. The only way the operator can proceed is by inserting the programming key and entering the programming mode.

If the terminal is using a 761 for data collection, the status of the 761 is checked during power up. The 761 is checked to see that its power is on, a cassette is in place, and a tape change is not required. If the 761 does not check, the COMM ALERT light flashes on and off and a "beeping" tone is sounded until the inoperative condition of the 761 is cleared or the operator presses the "6" key to go off line.

After all checks have been accomplished, the qualification panel is illuminated, providing that the cash drawer is closed (if required by programming) and a journal low condition is not present. The qualification panel being illuminated indicates that the 280 is fully upsequenced and ready to perform transactions.

Table C-1 Operator lead-through

INSTRUCTION	RESPONSE
Qualification Panel illuminated	Enter qualification code of the desired transaction type
ID NO.	Enter the operator identification number
*DEPT	Enter the department number of the sale item or press the X key to illuminate the DATA descriptor. If the X key is pressed, enter the desired miscellaneous data. After entering the data, the terminal again illuminates DEPT.
*CLASS	Enter the classification number of the item.
*MDSE NO.	Enter the merchandise identification number of the item sometimes referred to as SKU (stock-keeping unit.)
DATA	Enter miscellaneous data concerning the item.
QTY/ or X PRICE	If more than one identical item, enter the quantity of items; press either the /FOR key if no price multiplication, or press the X key if price multiplication is desired; and then enter the item price. If only one item, enter the item price.
*DEPT	If another merchandise item is to be recorded on this transaction, enter the department number of the item. If department number data is entered at this point, the CLASS descriptor illuminates next, and the above sequence is repeated from that point. When no more merchandise items are to be entered, press the END MDSE END RETURNS key or the TOTAL key to exit this sequence. Pressing the END MDSE END RETURNS key causes the following nonmerchandise descriptors to illuminate.
DISCOUNT -1 FEE -2 MISC CR -3 CSH DEP -4 CHG DEP -5 DATA -6	Enter the number of the nonmerchandise sequence desired. For example, enter a 2 for the fee sequence. When the sequence is completed, press the TOTAL key to exit, causing the TAX AMT descriptor to illuminate. The nonmerchandise descriptors are not illuminated when the TOTAL key is pressed at DEPT.
TAX AMT	Enter the amount or percent of tax. This descriptor is not illuminated if the automatic tax only option is being used.
AMT TEND	Enter the amount tendered by the customer. If the payment is made by check, index the check account number of up to 8 digits, press the /FOR key, then enter the amount of the check. If check number data capture is not required, press the /FOR key and enter the check amount.
CHANGE DUE	Provide the customer with the amount indicated.

* The DEPT, CLASS, and MDSE NO. descriptors may be illuminated in any sequence that the store desires. The additional response shown at DEPT is required for the first position of the sequence used.

NOTE: "Enter" as used above indicates that the desired data should be indexed and the ENTER key pressed.

Table C-2 Qualification codes

QUAL. CODE	TRANS. TYPE	SLIP ENFORCE		MEDIA CNT.		SAMPLE MNEMONIC (PROGRAMMABLE)	COMMENTS
		NO	PROG.	NO	PROG.		
0	CHARGE		X		X	NONE	
1	CASH		X		X	CSH.	
2	CASH		X		X	CSH.	
3	CHARGE		X		X	CHG.	
4	CHARGE		X		X	CHG.	
5	CHARGE		X		X	CHG.	
6	BANK CHG.		X		X	CHG.	NO ACCT. NO.
7	BANK CHG.		X		X	CHG.	NO ACCT. NO.
10	COD		X		X	COD	
11	LAYAWAY		X		X	LWY	
12	NO SALE		X		X	NONE	
13	VOID		X		X	NONE	PRINTS VOID
14	REC. ON ACCT.		X		X	ROA	
15	CHARGE		X		X	NONE	
16	CASH		X		X	NONE	
17	BANK CHG.		X		X	NONE	NO ACCT. NO.
20	CASH RTN.		X		X	CSH.	
21	CHG. RTN.		X		X	CHG.	
22	CHG. RTN.		X		X	CHG.	
23	CHG. RTN.		X		X	CHG.	
24	CHG. RTN.		X		X	CHG.	
25	CHG. RTN.		X		X	CHG.	
26	BANK CHG. RTN.		X		X	CHG.	NO ACCT. NO.
27	BANK CHG. RTN.		X		X	CHG.	NO ACCT. NO.
30	CASH EXCH.		X		X	CSH.	
31	CHG. EXCH.		X		X	CHG.	
32	CHG. EXCH.		X		X	CHG.	
33	CHG. EXCH.		X		X	CHG.	
34	CHG. EXCH.		X		X	CHG.	
35	CHG. EXCH.		X		X	CHG.	
36	BANK CHG. EXCH.		X		X	CHG.	NO ACCT. NO.
37	BANK CHG. EXCH.		X		X	CHG.	NO ACCT. NO.
40	CHARGE	X		X		NONE	
41	CHARGE	X		X		NONE	
42	CASHIER OPEN	X		X		NONE	
43	CLERK OPEN	X		X		NONE	
44	CLOSING	X		X		NONE	
45	RE-ENTRY	X		X		NONE	
46	BANK CHG.	X		X		NONE	NO ACCT. NO.
47	PROGRAMMING	X		X		NONE	

SELECTING A QUALIFICATION CODE

The operator selects a qualification code from the illuminated qualification panel corresponding to the type of transaction to be initiated. A list of the qualification codes that may appear on the qualification panel and the transaction type of each code are depicted in table C-2. Normally the first transaction performed after upsequence is the opening operation.

OPENING

An opening is usually the first sequence performed after powering up the 280. One of two opening sequences may be chosen from the qualification panel. The operator enters code 42 when a cashier opening is desired or code 43 for a clerk opening. To enter a number, the operator indexes it on the keyboard, then presses the ENTER key to put away the data. When a cashier opening is selected the operator identification number entered is stored in the read/write memory for use during merchandise transactions. Following the entry of a qualifiation code, the ID NO. descriptor is illuminated, which instructs the operator to enter an identification number. After entering the operator identification number, the operator is instructed to enter the date by the illuminated DATE descriptor. The date is entered by indexing the month, day, and year using one or two digits for each field, separating each field by pressing the /FOR key, and pressing the ENTER key. The use of the /FOR key is optional through programming. For example, the date May 15, 1972 may be entered as 5/15/72 or 51572. The ENTER key is pressed without entering date data when it is desirable to use the date stored in the read/write memory from a previous opening. The date remains in the 280 through power downsequence and upsequence. All of the data entered during an opening except the clerk ID number is stored in the read/write memory for use during other transactions. After the date entry, the cash drawer opens and opening data is printed on the receipt and journal. Generally, the operator loads the drawer with the cash required to begin the day. After closing the drawer, the qualification panel is illuminated and the 280 is ready to accept another transaction.

NOTE: If a new date is entered, the "have been offline" flag is reset.

PERFORMING MERCHANDISE TRANSACTIONS

Merchandise transactions are the most common operations performed by the user. There are many types of merchandise transactions provided by the 280. For the purpose of illustration, one typical transaction which contains the following operation parameters is described.

The operation flow (figure C-10) may be used with these parameters and may also be used to follow other types of 280 transactions.

- The transaction is a cash sale.
- The operator is a clerk.
- The terminal is programmed to assume that items are normally taxable on both merchandise and nonmerchandise entries.
- The merchandise to be sold consists of one coat costing $25.00, one package (three pairs) of socks costing $5.00, and two identical shirts costing $10.00 each.
- The socks are not taxable.
- The purchaser is an employee of the store and is authorized a 10 percent discount.
- The terminal has a 10 percent discount constant programmed for use during automatic discount calculations.
- The terminal is programmed to automatically calculate discounts on both itemizers. (This programming is not permitted when using the 761 for data collection).
- The terminal incorporates the Automatic Tax Only (ATO) programmable tax option.
- A 5 percent tax is programmed for automatic tax computation.
- Check validation is programmed but check authorization is not.

At the beginning of the operation flow in figure C-10, the operator enters a qualification code of 1 (cash), which initiates a merchandise transaction sequence. After entering the qualification code, the operator is instructed to enter an identification number by the ID NO. descriptor being illuminated.

The ID NO. descriptor does not light if a cashier opening has been performed. The operator enters an identification number either manually through the keyboard or automatically by scanning an identification tag with the 785 Wand Reader. After the identification number is entered, the DEPT NO. descriptor is illuminated.

Since a merchandise data entry is to be performed, the operator enters the department number for the first item (coat). The CLASS NO. descriptor is illuminated, and the operator enters the class number of the coat. The MDSE NO. descriptor is illuminated, and the operator enters the merchandise number of the coat. The DATA descriptor is illuminated, and the operator enters any miscellaneous data pertaining to the coat, such as style or color codes. The QTY/ or X PRICE descriptor is then illuminated instructing the operator to enter the item price. The operator enters $25.00 as the price of the coat. The 280 adds the price of the coat $25.00 to the taxable itemizer which previously contained zero. The DEPT NO. descriptor is illuminated, and the 280 is ready for the next merchandise item to be entered (socks).

NOTE: Department number, class number, merchandise number, and quantity/price entries may also be entered by using the 785 Wand Reader.

The operator presses the MODIFY TAX key since the socks are not taxable and the terminal is programmed to treat merchandise items as normally taxable. This action by the operator causes the TAX EXCEPTION descriptor to illuminate. The operator then enters the department number, class number, merchandise number, and miscellaneous data of the socks in the same manner as performed when entering the merchandise data for the

coat. After entering the merchandise number and seeing the QTY/ or X PRICE descriptor lit, the operator indexes 3, depresses the /FOR key, and enters the package price of the socks ($5.00). The $5.00 is added to the nontaxable itemizer, which previously contained zero, and the DEPT NO. descriptor is again illuminated.

The merchandise data entry sequence is performed on the shirts in the same manner as performed on the coat with the exception occuring at the price entry point. When the QTY/ or X PRICE descriptor is illuminated, the operator indexes 2, presses the X key, and enters the price of one shirt ($10.00). The 280 multiplies the quantity (2) times the price ($10.00) and adds the product ($20.00) to the taxable itemizer. The taxable itemizer now contains $45.00. The DEPT NO. descriptor is again illuminated.

The operator has no more merchandise items to enter for this transaction, but since the customer is an employee of the store, a nonmerchandise sequence (discount) is required. The operator presses the END MDSE END RETURNS key and the 280 advances to the nonmerchandise data entry sequence. At this point in the operation, all of the nonmerchandise descriptors are illuminated (DISCOUNT-1, FEE-2, MISC CR-3, CSH DEP-4, CHG DEP-5 and DATA-6). The customer is entitled to a discount. The operator enters the discount code (1) and the ID NO. descriptor is illuminated. The operator enters the identification number (employee number or equivalent) of the customer.

NOTE: This identification number may be entered through use of the 785 Wand Reader.

The PERCENT descriptor is illuminated to instruct the operator to enter a discount percent. Since a 10 percent discount constant is stored in the terminal, the operator chooses an automatic discount calculation by pressing the ENTER key. The 280 automatically calculates the discount on both the taxable and nontaxable itemizers. After calculation, the taxable itemizer contains $40.50 and the nontaxable itemizer contains $4.50.

With all nonmerchandise entries completed, the operator presses the TOTAL key which advances the 280 to the tax sequence. Since the 280 is being operated with the Automatic Tax Only (ATO) option, no operator intervention is required to calculate the tax. The 280, using the stored tax percentage, calculates the amount of tax on the taxable itemizer. After calculating the tax amount, the 280 adds the amount to the taxable itemizer. The amount of tax is $2.25 (5 percent) and is added to $40.50, resulting in the content of the taxable itemizer now equaling $42.75.

The 280 then advances to the end transaction sequence. The taxable itemizer is added to the nontaxable itemizer and the result ($47.25) is displayed with the AMOUNT/TOTAL descriptor illuminated. At this point the AMT TEND descriptor is also illuminated which instructs the operator to enter an amount tendered.

The customer wishes to pay with a $50.00 check. The operator may ask for some identification before accepting the check. In this case the customer gives his check cashing identification card number (1859). The operator indexes 1859, presses the /FOR key to indicate a check tendered, and enters the amount of the check ($50.00). The INSERT SLIP descriptor is illuminated which instructs the operator to insert the check face down into the slip print station.

The operator then presses the CLEAR key, and the 280 prints the identification number (1859) and the amount of the check ($50.00) on the back of the check. The 280 subtracts the sale amount from the amount tendered and displays the change due ($2.75). The cash drawer opens, permitting access to its content.

After giving the customer his change and receipt, the operator closes the cash drawer. The qualification panel is illuminated and the 280 is ready to perform another transaction.

CLOSING

The closing sequence may be performed at the end of the day or with the change of operators. To initiate a closing sequence, the operator enters a qualification code of 44 which directs the 280 to the special sequence (closing). The ID NO. descriptor is illuminated and the operator enters his identification number. The 280 then advances to the closing sequence and opens the cash drawer. The QTY/ or X PRICE descriptor is illuminated. At this point the operator may initiate a cash count sequence by entering the quantity times the denomination of the coins, currency, and checks contained in the cash drawer. After entering each denomination, the result of the multiplication performed is displayed, printed, and added to the taxable itemizer. The taxable itemizer is at zero before starting the cash count. When all denominations have been counted, the operator presses the TOTAL key causing the content of the taxable itemizer to be displayed.

If a read or reset of the 280 totals is desired, the appropriate key must be inserted and actuated prior to pressing the TOTAL key. If a read or reset is chosen, the sales and returns totals are printed. The cash total is also printed if the 280 is programmed for a cash total print. If a reset is chosen, the returns total, cash total, and media count are reset. Reset of the sales total is optional through programming. Also, during reset, the mnemonic RST is printed which indicates that the totals have been reset. If the 280 has been offline since the last opening sequence with date entry, slashes (/'s) are printed. The footer data and the cash count total are printed at the end of a closing. When the cash drawer is closed, the qualification panel is illuminated, and the 280 is ready to perform a new transaction sequence.

OPERATOR INPUT ERRORS

The terminal provides detection of erroneously entered data by turning on the error light, sounding the error tone, and preventing further operation. The operator course of action when an error occurs is to press the CLEAR key and follow the lead through instructions illuminated on the display. An error occurs as the result of any of the following conditions.

Maximum field size of the input data exceeded.

Data entry enforced and no data entered.

Function key pressed that is locked out when pressed at this point in the transaction.

Pressing CLEAR key twice in succession, except when truncating.

Two or more keys pressed simultaneously.

Data entered that does not verify in a field that requires check digit verification.

Slip not inserted on an operation that enforces the use of a slip (error tone does not sound).

End of slip (insert new slip).

Item quantity greater than 99 entered (or 99.99 if four digit quantity programmed legal).

Amount tendered less than total cash amount unless check is tendered and 280 is programmed for multiple checks.

Erroneous qualification code entered.

Erroneous nonmerchandise code entered.

More than one deposit entered.

A discount is entered after a deposit.

A transaction is programmed for validation and media is not inserted in the slip station (error tone does not sound).

Data collect buffer overflow can occur during a transaction if the data collect buffer cutoff word is erroneously programmed. When this happens the error tone sounds, the COMM ALERT descriptor is illuminated, and the ERROR light is illuminated. Downsequencing the 280 is the only way to reset this condition.

TRANSACTION ABORT

The operator may abort any transaction, if the terminal is programmed to permit it, by first pressing the ITEM CORRECT key, then the TOTAL key. If the transaction is aborted before the header line is printed, no printing or transmission occurs, and the transaction and media counters are not incremented. This procedure may be used to clear residual data displayed on the 790 Remote Display between transactions.

If an abort is made after the header line is printed, the terminal prints the transaction type, the transaction total to the point of aborting, and a series of VOID's. This is printed on the journal and either the receipt or slip or both, whichever is being used. The transaction total is also added into the permanent totals according to transaction type except the cash total. All data entered to the point of aborting is sent to the data collector. The terminal identifies an abort by inserting two record separators (RS) followed by a file separator (FS) into the data message.

NOTE: The aborted transaction is an incomplete transaction but not a voided transaction. It is not treated as a void by the central processor. If voiding is desired, a void transaction sequence must be performed using the transaction number of the aborted transaction.

COLOR CODED TAG READING

Merchandise tags may be read and accepted at the first merchandise data entry point (DEPT) providing that data has not yet been manually entered. If data is manually entered, the tag reader is blocked out. The merchandise tags contain department number through price information and may contain additional data not available for manual entry. Identification number and account number tags are accepted only at their associated data entry points. These tags are also locked out if data is manually entered.

The only data displayed from any tag read operation is the price field. The quantity is not encoded on the tag and is inserted in the data collect buffer as a quantity of one by the 280. A programmable option permits keyboard entry of a quantity for item extension before reading the tag.

Upon completion of the tag read operation, a data entry complete tone is sounded by the 280, providing that no errors are encountered.

PRICE CHANGE OR EMPTY PRICE FIELD

Pressing the PRICE CHANGE key prior to reading a tag or reading an empty price field provide the same indication. An empty price field refers to a price field containing either no digits or zeros. With either of the preceding occurrences, the terminal reads the tag normally, sounding the data entry complete tone, then sounds the data entry incomplete tone and illuminates the QTY/ or X PRICE descriptor. Any attempt to read another tag at this point results in an error. The operator must manually enter the desired quantity price information. A quantity of more than one may be entered at this point to provide multiple item extension.

ERRORS

Conditions encountered when reading color coded tags sometimes result in the need for operator intervention. These conditions and operator procedures are the following.

When a tag is scanned at an illegal tag entry point, the terminal sounds the error tone and illuminates the error light. This condition requires the operator to press the CLEAR key then follow the lead-through instructions. When a tag read is attempted at qualification entry point the 785 is ignored by the 280.

When a tag containing an empty price field is scanned or when price change is used, the terminal first sounds the data entry complete tone indicating a good tag read, and then it sounds the data entry incomplete tone indicating a need for operator intervention. The operator is instructed to enter price data by the QTY/ or X PRICE descriptor being illuminated.

When a tag is improperly scanned or is improperly encoded, the terminal sounds the data entry incomplete tone and does not illuminate the error light. The operator may either rescan the tag or enter the data manually.

When a tag that contains CDV checkable fields (ID and account number) is scanned and the tag is read correctly but a CDV check failure is detected by the terminal, the data entry complete tone is first sounded; then the error tone is sounded and the error light is illuminated. This usually indicates that the CDV scheme used in creating the tag is different from that programmed in the 280. When this occurs, the operator or supervisor should check the CDV schemes used after making an unsuccessful attempt to enter the data manually.

When a tag is scanned that contains a price field of more than 7 digits, the terminal hangs up, preventing further data entry. The operator or supervisor should check the programming of the 280 and the 747 to be sure that the maximum field sizes are programmed correctly.

NOTE: The maximum field sizes of merchandise data words department, class, and merchandise number are not checked during tag read operations. Incorrect programming may result in some of the data sent from the tag not being printed.

OFFLINE OPERATION

When in the offline mode of operation, the 280 does not transmit data to the data collector. The 280 prints a line of data at the end of each transaction performed while offline. This print line consists of a series of slashes, an error type code, (refer to the Data Collection section), an NT symbol (not transmitted), another series of slashes, and a hash total. The hash total is the sum of the sales and returns totals added together. This hash total is used during re-entry sequences for balancing purposes and does not include the amount of the last transaction which was not transmitted.

When communication to the data collector is re-established, the 280 goes online. If this occurs after the identification number entry, the current transaction is completed offline. In this case transmission is permitted during the next transaction.

The 280 turns ON the COMM ALERT descriptor between transactions while operating in offline mode.

NOTE: The COMM ALERT descriptor is OFF during offline transactions.

If communication is established between transactions, the COMM ALERT descriptor goes OFF indicating that the 280 is back online. The COMM ALERT descriptor is used only to indicate communication status and does not affect offline operation of the 280. For further information, refer to the Data Collection section.

RE-ENTRY PROCEDURE

A re-entry sequence is performed to record the transactions on tape that were not previously recorded because of the 280 being offline. Re-entry may be performed at any terminal that is currently operating in the online mode.

The re-entry sequence begins with the operator entering a qualification code of 45, then entering the operator identification number. The terminal then prints the header, sets the re-entry flag, and prints the footers completing the setup for re-entry operation.

The qualification panel is illuminated to instruct the operator to enter a qualification code. The code entered should be that of the transaction to be re-entered. The TRANS NO./ TERM NO. descriptor is illuminated, instructing the operator to enter the transaction and terminal number of the re-entered transaction. The remainder of the transaction data is entered as it appears on the journal. The /FOR key is used instead of the X key when re-entering multiple quantity items that were previously multiplied. The pressing of the X key at the first merchandise entry point may be used to access the miscellaneous data word to re-enter transparent data from color coded tag input.

The transactions which have been completed offline are indicated by slash marks in the footer data.

Two or three transactions prior to the first offline transaction should also be re-entered, since their data may not have been recorded on tape.

Once a re-entry transaction (45) is performed, the terminal regards all following transactions as re-entered transactions and requires the entry of a transaction and terminal number for each. The 280 does not automatically increment the transaction number. The only method of exiting from re-entry mode is to power down the terminal.

ONLINE CREDIT AUTHORIZATION PROCEDURE

This procedure is applicable only to terminals using the 723 Level III configuration for data collection. Terminals using a 761 data collector do not have online credit authorization capability. When the account number is entered during a charge transaction, the terminal checks the amount against the minimum floor limit. If the amount is below the minimum floor limit (0-$99), the terminal automatically extends credit without accessing the central file. If the amount is above the minimum floor limit, the terminal transmits the terminal number, transaction number, transaction type code, the account number, and amount of credit purchase to the central file. The response from central is a message up to 8 digits in length with the least significant digit being the authorization code (0-9). The terminal automatically completes the transaction if the authorization code is "0", meaning approved. The terminal displays one of these codes (1-8) and waits for the operator to press the data key corresponding to the code displayed. If the code is not a "7", the code is printed along with the account number when the key is pressed. If the code is a "7", the terminal automatically aborts the transaction when the operator indexes the code "7" on the keyboard. The terminal ignores any code pressed other than the one displayed. When the transaction is completed, the total is added into the permanent totals regardless of the code received.

OFFLINE CREDIT AUTHORIZATION PROCEDURE

If the central file is down, the code received was a 9, or if the terminal is not connected to a credit authorization system, the terminal automatically compares the charged amount with the programmable stored floor limit (0-$9999).

If the amount is equal to or less than the limit, a code of "0" is generated and the transaction is completed. If the amount is greater than the limit, a code of "9" is displayed which indicates that credit is rejected.

If credit is rejected, the operator may complete the current transaction by pressing the 9 key. The operator may then void the transaction by initializing a void transaction sequence, or he may abort the transaction if the terminal is programmed to permit it.

CHECK AUTHORIZATION PROCEDURE

This procedure is applicable only to terminals using the 723 Level III configuration for data collection. Terminals using a 761 data collector do not have online check authorization capability. If the operator presses the /FOR key when the AMT TEND descriptor is illuminated, the terminal assumes that a check is being tendered. If data has been entered before pressing the /FOR key, the terminal assumes that this data is the check account number and data following the /FOR key depression is the amount of the check. A check number of up to 12 digits may be entered and printed, but only the 8 least significant digits are sent to the central file. The response codes and other procedures are the same as those described for credit authorization, except that no floor limits are used. All checks tendered are referred to the central file providing that the "check authorization" bit is set and the central file is online.

OPERATION FLOW

Operating the 280 begins with powering up the unit and performing a special transaction (opening). After performing the opening transaction, merchandise transactions are performed throughout the course of the day. At the end of the day or with the change of operators, another special operation (closing) is performed. This is the general sequence for operating the 280. Figure C-9 contains a simplified data entry flow showing the sequence of entering merchandise information. Figure C-10 contains an operation flow showing each point of operator data entry and general information relative to each operation performed by the 280.

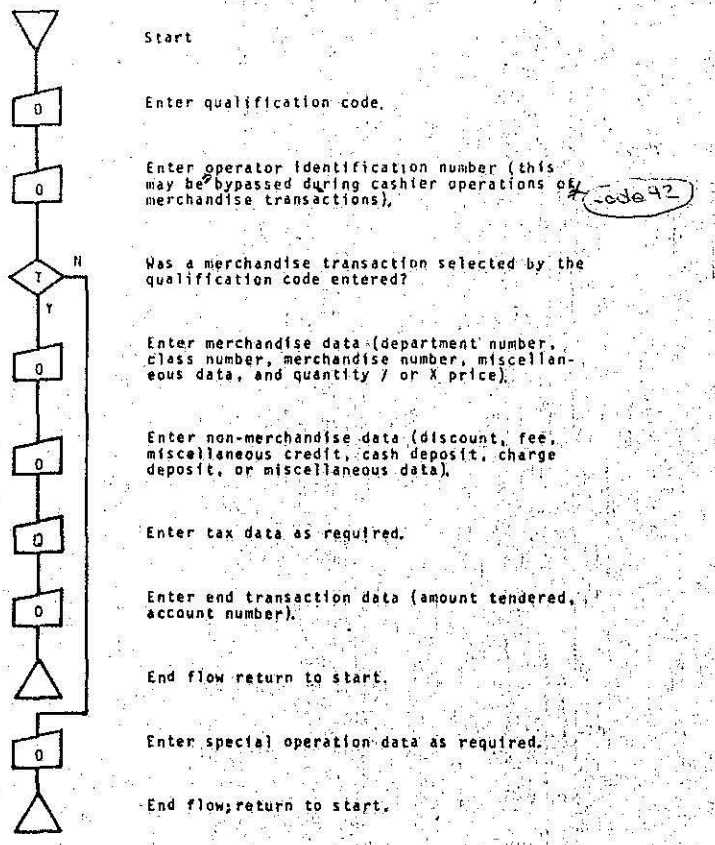
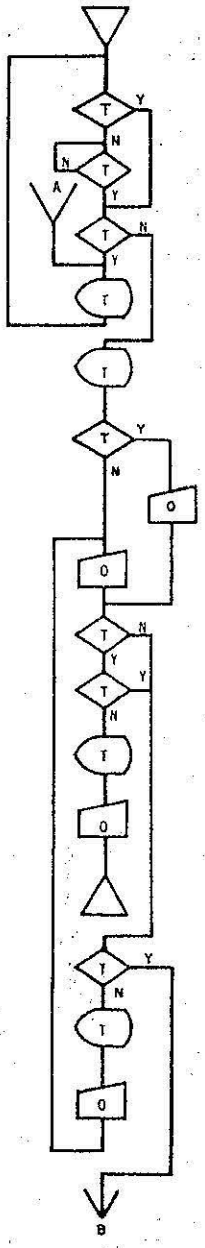

Start
0
Enter qualification code.
0
Enter operator identification number (this may be bypassed during cashier operations or merchandise transactions).
T
N
Y
Was a merchandise transaction selected by the qualification code entered?
0
Enter merchandise data (department number, class number, merchandise number, miscellaneous data, and quantity / or X price).
0
Enter non-merchandise data (discount, fee, miscellaneous credit, cash deposit, charge deposit, or miscellaneous data).
0
Enter tax data as required.
0
Enter end transaction data (amount tendered, account number).
End flow return to start.
0
Enter special operation data as required.
End flow; return to start.

Figure C-9 Simplified data entry flow



Start operation flow (280 upsequenced)

Programmed for open cash drawer operation?

Is cash drawer closed?

Is journal low?

Illuminate journal low descriptor.

Illuminate qualification panel.

Programmed for automatic qualification code entry?

Press ENTER key.

Enter qualification code

Was code 47 (programming)?

Is programming key activated?

Error.

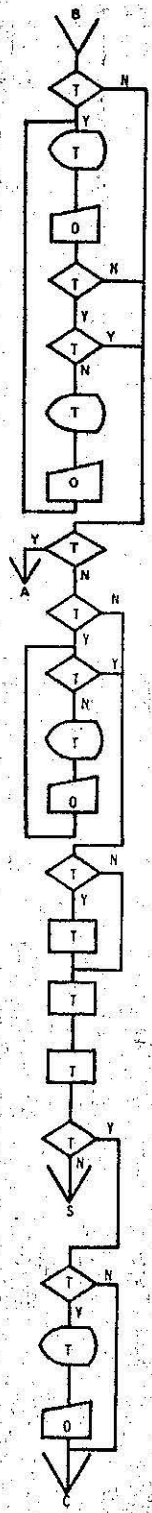
Press CLEAR key.

End flow go to start operation flow (this page).

Is qualification code legal?

Error.

Press CLEAR key.



(Clerk operation) or (qualification codes 40-47?) YES. NO. ANSWER TO GATE.

Illuminate ID NO.

Enter operator identification number.

Is CDV check enforced?

CDV checks okay?

Error

Press CLEAR key.

Is journal low?

Is slip required?

Is slip inserted?

Illuminate INSERT SLIP and error light.

Press CLEAR key.

Is media count to be incremented?

Increment media count.

Increment transaction number.

Print header data in accordance with programmable print options.

Is this a merchandise transaction?

Go to special transaction

Is this a re-entered transaction (re-entry flag set)?

Illuminate TRANS NO./TERM NO.

Enter transaction and terminal number of transaction to be re-entered.

Go to merchandise data.

NOTE: Special transactions are no sale, void, opening, closing, re-entry, and programming.

Figure C-10 Operation flow (1 of 15)

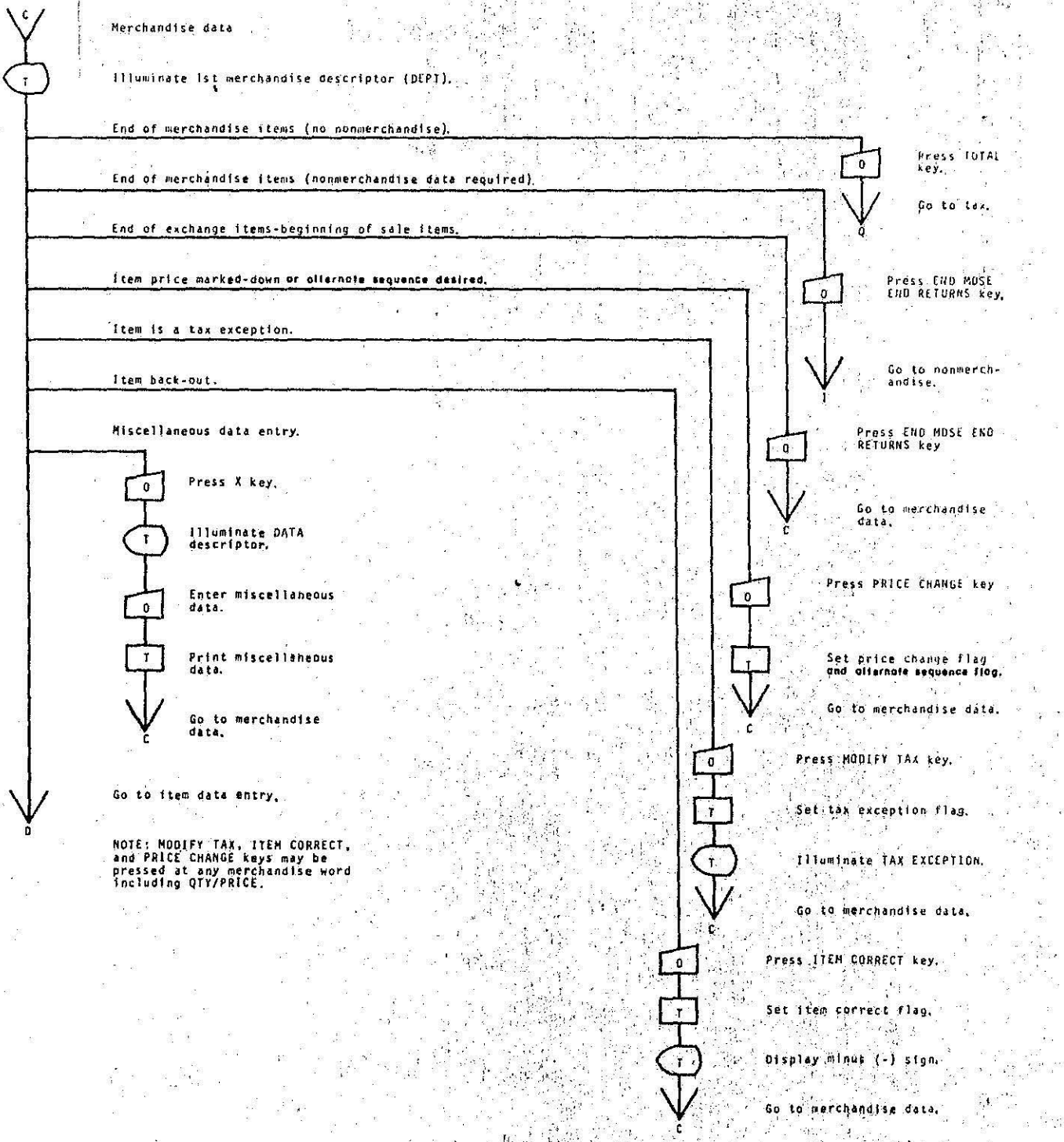
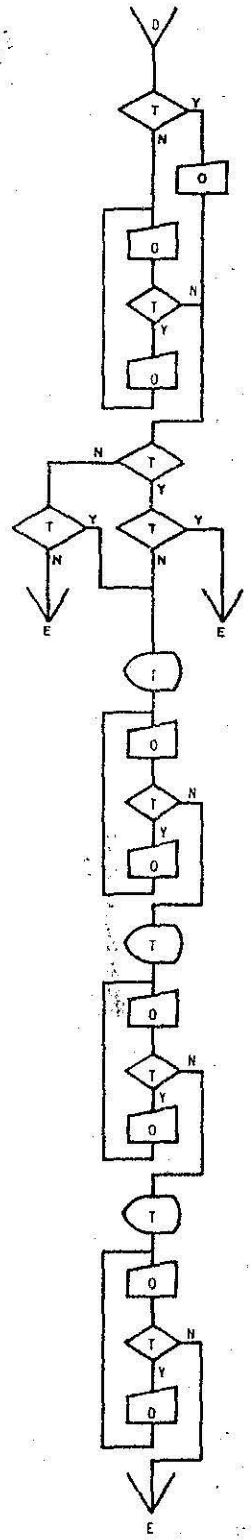


Figure C-10 Operation flow (2 of 15)



Item data entry.

Programmed for automatic 1st merchandise data entry?

Press ENTER key.

Enter 1st merchandise data (DEPT).

Minimum field size or CDV check error?

Press CLEAR key.

Primary sequence long?

Alternate sequence flag set?

Go to price.

Illuminate 2nd merchandise data descriptor (CLASS).

Enter 2nd merchandise data (CLASS).

Maximum field size or CDV check error?

Press CLEAR key.

Illuminate 3rd merchandise data descriptor (MDSE NO.).

Enter 3rd merchandise data (MDSE NO.).

Maximum field size or CDV check error?

Press CLEAR key.

Illuminate miscellaneous data descriptor (DATA).

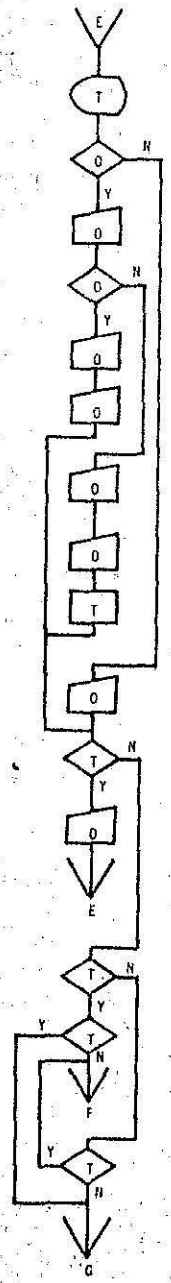
Enter miscellaneous data (DATA).

Maximum field size or CDV check error?

Press CLEAR key.

Go to price.

NOTE: Merchandise item data may be programmed to be printed at each point of entry.



Price

Illuminate QTY / OR X PRICE descriptor.

Multiple items?

Enter the quantity.

Package of items?

Press the / FOR key.

Enter the package price.

Press the X key.

Enter the unit price of the item.

Multiply quantity times the price.

Enter the item price (the 280 assumes a quantity of one).

Maximum field size exceeded?

Press CLEAR key.

Go to price.

Is terminal operating with items normally taxable (merchandise SI bit not set)?

Is tax exception flag set?

Go to taxable price.

Is tax exception flag set?

Go to nontaxable price.

Figure C-10 Operation flow (3 of 15)

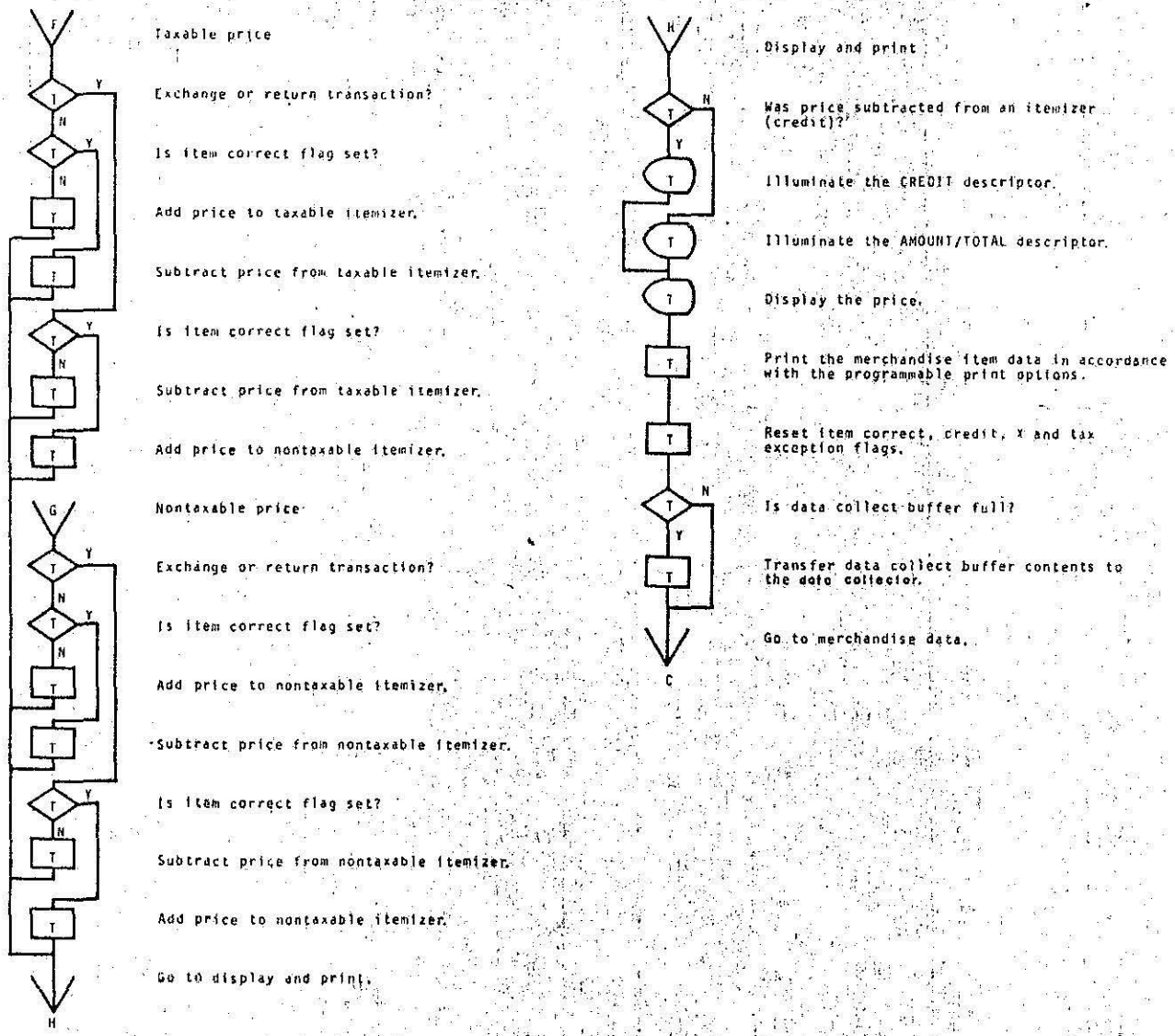

F
Taxable price
Exchange or return transaction?
Is item correct flag set?
Add price to taxable itemizer.
Subtract price from taxable itemizer.
Is item correct flag set?
Subtract price from taxable itemizer.
Add price to nontaxable itemizer.
G
Nontaxable price
Exchange or return transaction?
Is item correct flag set?
Add price to nontaxable itemizer.
Subtract price from nontaxable itemizer.
Is item correct flag set?
Subtract price from nontaxable itemizer.
Add price to nontaxable itemizer.
Go to display and print.
H
Display and print
Was price subtracted from an itemizer (credit)?
Illuminate the CREDIT descriptor.
Illuminate the AMOUNT/TOTAL descriptor.
Display the price.
Print the merchandise item data in accordance with the programmable print options.
Reset item correct, credit, X and tax exception flags.
Is data collect buffer full?
Transfer data collect buffer contents to the data collector.
Go to merchandise data.
C

Figure C-10 Operation flow (4 of 15)

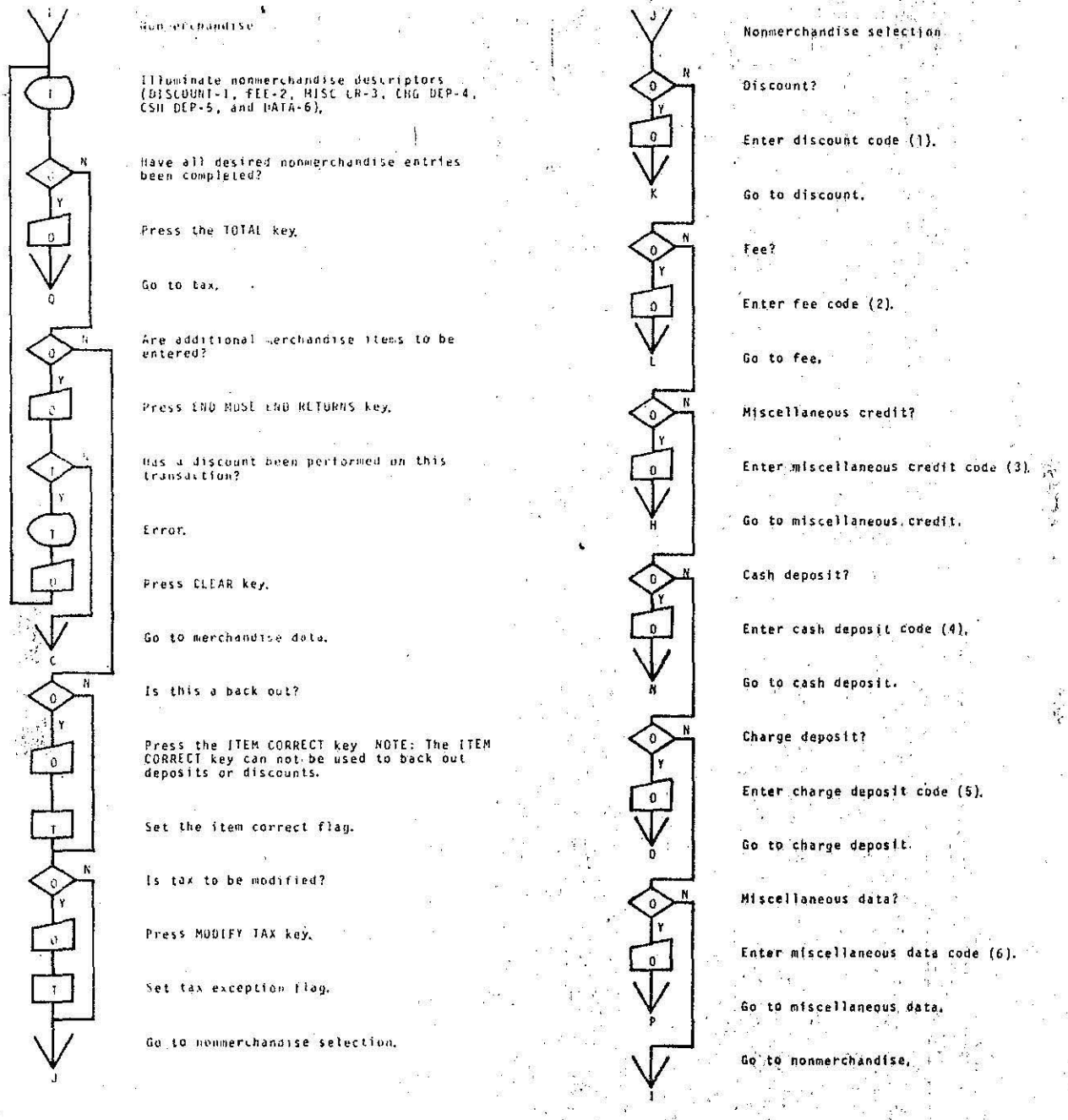
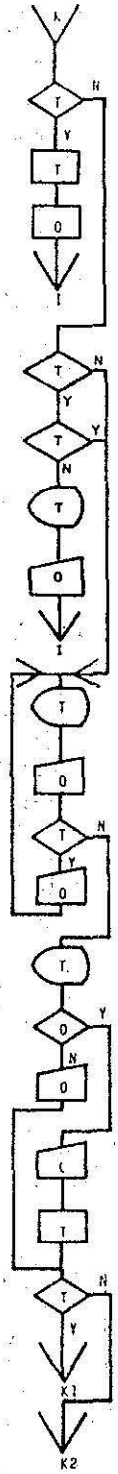

Nonmerchandise
Illuminate nonmerchandise descriptors (DISCOUNT-1, FEE-2, MISC CR-3, CHG DEP-4, CSH DEP-5, and DATA-6).
Have all desired nonmerchandise entries been completed?
Press the TOTAL key.
Go to tax.
Are additional merchandise items to be entered?
Press END MDSE END RETURNS key.
Has a discount been performed on this transaction?
Error.
Press CLEAR key.
Go to merchandise data.
Is this a back out?
Press the ITEM CORRECT key. NOTE: The ITEM CORRECT key can not be used to back out deposits or discounts.
Set the item correct flag.
Is tax to be modified?
Press MODIFY TAX key.
Set tax exception flag.
Go to nonmerchandise selection.
Nonmerchandise selection
Discount?
Enter discount code (1).
Go to discount.
Fee?
Enter fee code (2).
Go to fee.
Miscellaneous credit?
Enter miscellaneous credit code (3).
Go to miscellaneous credit.
Cash deposit?
Enter cash deposit code (4).
Go to cash deposit.
Charge deposit?
Enter charge deposit code (5).
Go to charge deposit.
Miscellaneous data?
Enter miscellaneous data code (6).
Go to miscellaneous data.
Go to nonmerchandise.

Figure C-10 Operation flow (5 of 15)



Discount

Has deposit been previously performed on this transaction?

Error.

Press CLEAR key.

Go to nonmerchandise.

Has discount been previously performed on this transaction?

Programmed to allow multiple discount?

Error

Press CLEAR key.

Go to nonmerchandise.

Illuminate DISCOUNT and ID NO. descriptors.

Enter discount identification number.

Maximum field size or COV check error?

Press CLEAR key.

Illuminate DISCOUNT and PERCENT descriptors.

Automatic discount desired?

Enter discount percent.

Press ENTER key

Access discount percentage stored in read/write memory

Discount on both itemizers? (programmable for 783 models only)

Go to discount (buth itemizers).

Go to discount (either itemizer).

Discount (both itemizers)

Multiply discount percent times the content of the taxable itemizer and subtract the amount obtained from the taxable itemizer.

Multiply discount percent times the content of the nontaxable itemizer and subtract the amount obtained from the nontaxable itemizer.

Add discount amounts together to form the total discount amount.

Clear display.

Illuminate the AMOUNT descriptor and display the discount amount.

Print the discount data in accordance with the programmable print options (the discount percent is printed only if manually input).

Is data collect buffer full?

Transfer data collect buffer contents to data collector.

Go to nonmerchandise.

Discount (either itemizer)

Is 280 operating with nonmerchandise items normally taxable (nonmerchandise SI bit not set)?

Is tax exception flag set?

Calculate the discount amount by multiplying the taxable itemizer content by the discount percent.

Subtract the discount amount from the taxable itemizer.

Go to clear display.

Is tax exception flag set?

Calculate the discount amount by multiplying the nontaxable itemizer content by the discount percent.

Subtract the discount amount from the taxable itemizer.

Go to clear display.

Figure C-10 Operation flow (6 of 15)

Fee

Illuminate qualification panel

Illuminate the FEE descriptor.

Enter fee type code from qualification panel.

Illuminate FEE and AMOUNT descriptors.

Enter fee amount.

Display fee amount.

Is fee taxable?

NOTE: The fee is taxable when nonmerchandise entries are normally taxable (nonmerchandise SI bit reset) and the MODIFY TAX key has not been pressed; or when nonmerchandise entries are normally nontaxable (nonmerchandise SI bit set) and the MODIFY TAX key has been pressed.

Add the fee amount to the taxable itemizer (subtract if the item correct flag is set).

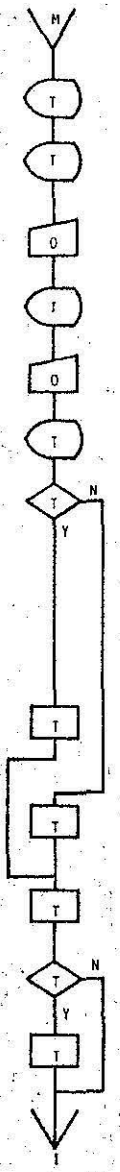
Add the fee amount to the nontaxable itemizer (subtract if the item correct flag is set).

Print fee data in accordance with the programmable print options.

Is data collect buffer full?

Transfer data collect buffer contents to the data collector.

Go to nonmerchandise.



Miscellaneous credit

Illuminate qualification panel.

Illuminate MISC CR descriptor.

Enter miscellaneous credit type code fro qualification panel.

Illuminate MISC CR and AMOUNT descriptors.

Enter the miscellaneous credit amount.

Display the amount.

Is miscellaneous credit taxable?

NOTE: The miscellaneous credit amount is taxable when nonmerchandise entries are normally taxable and the MODIFY TAX key has not been pressed; or when nonmerchandise entries are normally nontaxable and the MODIFY TAX key has been pressed.

Add the miscellaneous credit amount to the content of the taxable itemizer (subtract if the item correct flag is set).

Add the miscellaneous credit amount to the nontaxable itemizer (subtract if the item correct flag is set).

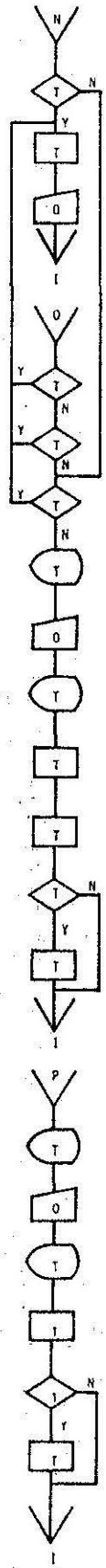
Print the miscellaneous credit data in accordance with the programmable print options?

Is data collect buffer full?

Transfer data collect buffer contents to the data collector.

Go to nonmerchandise.

Figure C-10 Operation flow (7 of 15)



Cash deposit

Is this a cash transaction?

Error

Press CLEAR key.

Go to nonmerchandise.

Charge deposit

Is this a charge transaction?

Is this a cash sale transaction?

Is this an exchange transaction?

Illuminate CSH DEP/CHG DEP and AMOUNT descriptors.

Enter deposit amount.

Display deposit amount.

Print deposit data in accordance with the programmable print options.

Subtract deposit amount from nontaxable itemizer.

Is data collect buffer full?

Transfer data collect buffer contents to the data collector.

Go to nonmerchandise.

Miscellaneous data

Illuminate DATA descriptor.

Enter miscellaneous data.

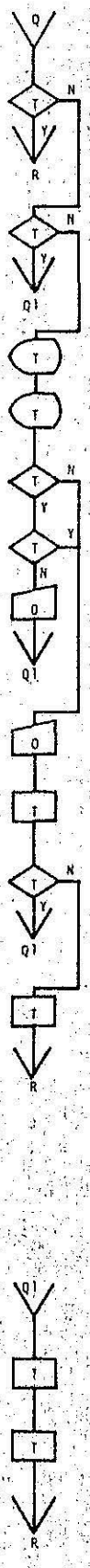
Display data entered.

Print miscellaneous data in accordance with the programmable print options.

Is data collect buffer full?

Transfer data collect buffer contents to the data collector.

Go to nonmerchandise.



Tax

Is the 280 programmed for the No Tax Option (NTO)?

Go to end transaction.

Is the 280 programmed for Automatic Tax Only (ATO)?

Go to automatic tax.

Display contents of the taxable itemizer.

Illuminate the TAX AMT descriptor.

Is the 280 programmed for the Manual or Automatic Tax option (M or A TAX)?

Is manual tax entry desired?

Press the ENTER key.

Go to automatic tax.

Enter the tax percentage
or the manually calculated tax amount
(may be preceded by a tax code and / entry)

Print manual tax data in accordance with programmable print options.

Is the 280 programmed for the Manual and Automatic Tax option (M and A TAX)?

Go to automatic tax.

Add the manual tax amount to the contents of the taxable itemizer.

Go to end transaction.

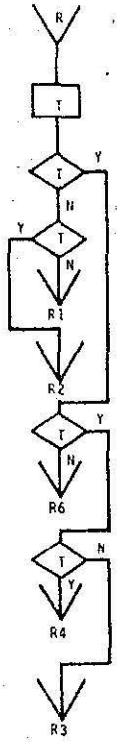
Automatic tax

Calculate the tax amount on the content of the taxable itemizer using stored percentage.

Print the automatically calculated tax amount data in accordance with the programmable print options.

Go to end transaction.

Figure C-10 Operation flow (8 of 15)



End transaction

Add taxable and nontaxable itemizers together.

Is this a COD or layaway transaction?

Is this a charge transaction?

Go to cash close out.

Go to charge close out.

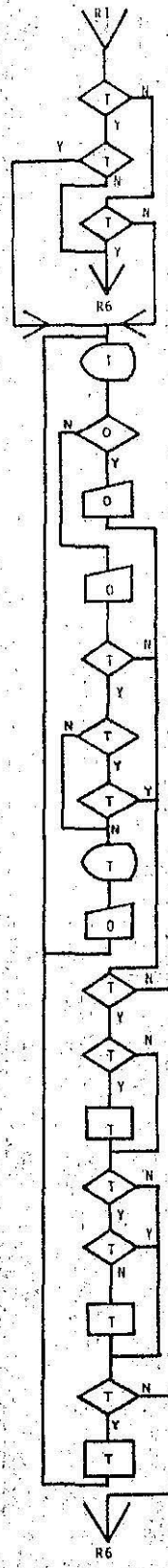
Was a deposit entry made?

Go to finalize.

Was deposit a charge?

Go to charge sale.

Go to display the deposit amount.



Cash closeout

Is this a cash exchange transaction?

Is the exchange a sale?

Is this a cash return transaction?

Go to finalize.

Display the amount of the sale and illuminate the AMT TEND descriptor.

Is cash amount tendered equal to amount displayed?

Press ENTER key.

Enter the amount tendered (If a check is tendered, the / FOR key should be pressed prior to entering the amount).

Is tendered amount less than amount required?

Was the /FOR key pressed?

Programmed to allow multiple checks?

Error

Press the CLEAR key.

Was the /FOR key pressed?

Is check authorization programmed and operating?

Perform check authorization process.

Is check validation programmed?

Is itemization on a slip?

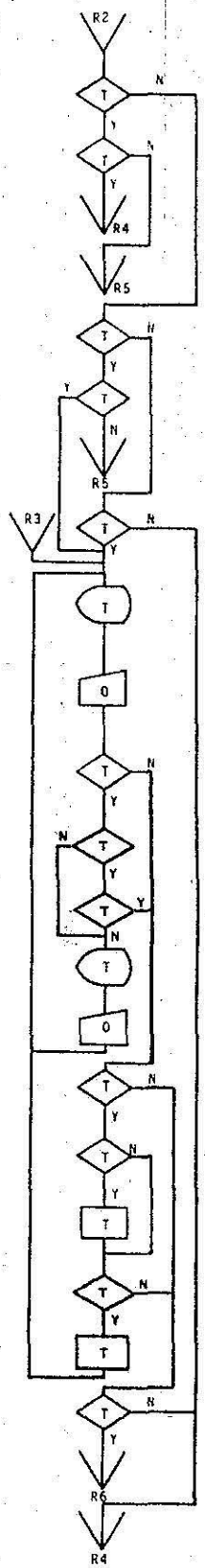
Validate check (print amount tendered on the check inserted in the slip printer).

Is tendered amount less than amount required?

Subtract amount tendered from total and display difference as new amount required.

Go to finalize.

Figure C-10 Operation flow (9 of 15)



Charge close out

Is this a charge exchange transaction?

Is the exchange a sale?

Go to charge sale.

Go to charge credit.

Is this a charge return transaction?

Was a deposit entry made?

Go to charge credit.

Partial cash payment (cash deposit on charge sale)?

Display the deposit amount and illuminate the AMT TEND descriptor.

Enter the amount tendered (if a check is tendered, press the /FOR key prior to entering the amount).

Is the tendered amount less than the amount required?

Was the /FOR key pressed?

Programmed to allow multiple checks?

Error

Press the CLEAR key.

Was the /FOR key pressed?

Is check authorization programmed and operating?

Perform check authorization process.

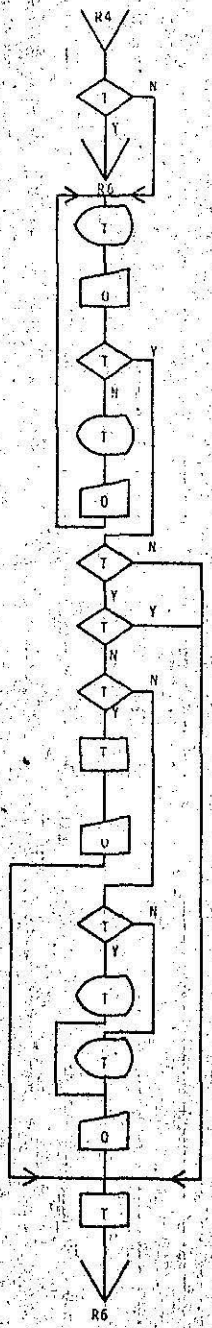
Is amount tendered less than amount required?

Subtract amount tendered from total and display new amount required.

Is this a COD or layaway?

Go to finalize.

Go to charge sale.



Charge sale.

Is this a bank card operation?

Go to finalize.

Illuminate the ACCT NO. descriptor.

Enter the credit account number.

Did CDV check pass? (only checked when programmed).

Error

Press the CLEAR key.

Is credit authorization programmed?

Is total less than the minimum floor limit?

Is credit authorization system operating?

Perform credit authorization process.

Enter the least significant digit of the response code (a zero response indicates the account number is approved).

Is the total greater than the maximum floor limit?

Display a response code of 9.

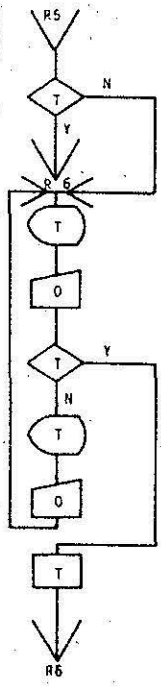
Display a response code of 8.

Enter either an 8 or 9 depending on the response.

Print account number data including credit authorization code (if any).

Go to finalize.

Figure C-10 Operation flow (10 of 15)



Charge credit

Is this a bank card operation?

Go to finalize.

Illuminate the ACCT NO. descriptor.

Enter the credit account number.

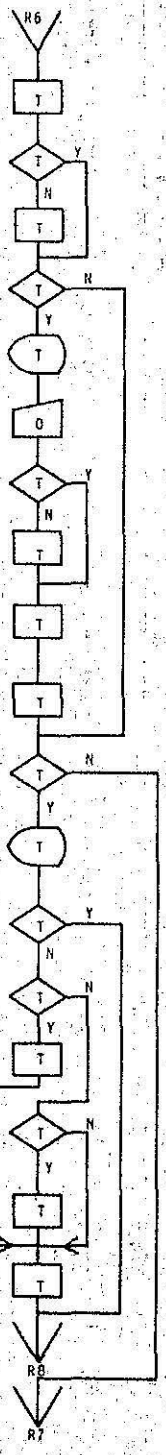
Did CDV check pass? (only checked when programmed).

Error

Press the CLEAR key.

Print the account number in accordance with the programmable print options.

Go to finalize



Finalize

Print first footer line.

Is the 280 programmed for a single footer

Print second footer line.

Is media validation programmed?

Illuminate the INSERT SLIP descriptor.

Insert a slip and press the CLEAR key

Was a slip enforced on this transaction?

Print the header on the slip.

Print the account number (if any) without a credit authorization code.

Print the footer and release the slip feed rolls.

Was any cash transacted?

Illuminate the CHANGE DUE descriptor and print the change due.

Is this a re-entered transaction (re-entry flag set)?

Was cash transacted in favor of the store?

Add the net cash transacted to the cash total.

Is the terminal programmed to permit subtraction from the cash total?

Subtract the net cash transacted from the cash total.

Open the cash drawer.

Go to update totals.

Go to non cash.

Figure C-10 Operation flow (11 of 15)

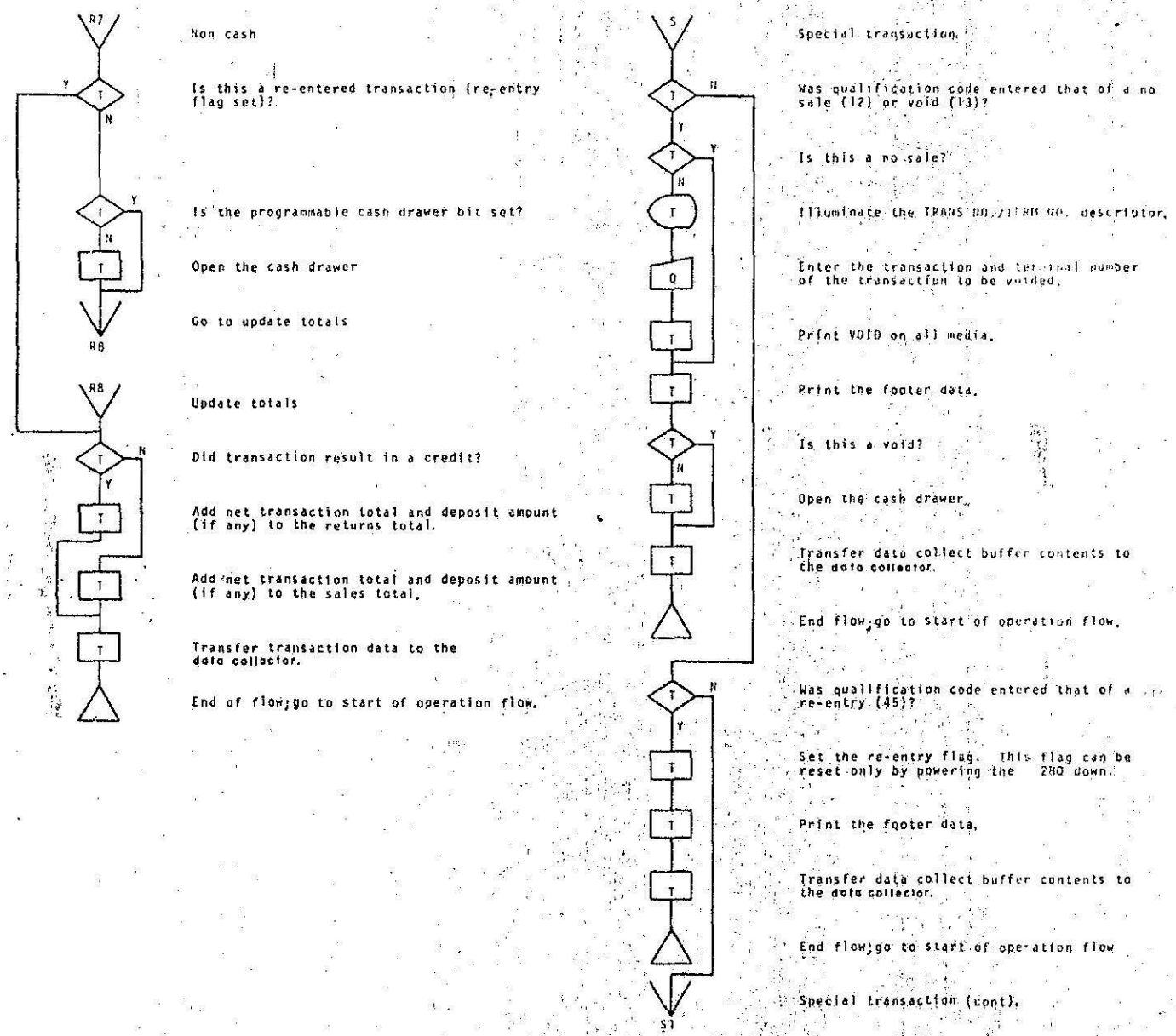
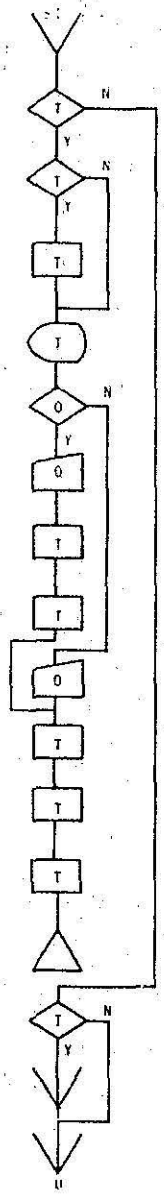

R7
Non cash
Is this a re-entered transaction (re-entry flag set)?
Y
N
Is the programmable cash drawer bit set?
Open the cash drawer
Go to update totals
R8
R8
Update totals
Did transaction result in a credit?
Add net transaction total and deposit amount (if any) to the returns total.
Add net transaction total and deposit amount (if any) to the sales total.
Transfer transaction data to the data collector.
End of flow;go to start of operation flow.
S
Special transaction
Was qualification code entered that of a no sale (12) or void (13)?
Is this a no sale?
Illuminate the TRANS NO./TERM NO. descriptor.
Enter the transaction and terminal number of the transaction to be voided.
Print VOID on all media.
Print the footer data.
Is this a void?
Open the cash drawer.
Transfer data collect buffer contents to the data collector.
End flow;go to start of operation flow.
Was qualification code entered that of a re-entry (45)?
Set the re-entry flag. This flag can be reset only by powering the 280 down.
Print the footer data.
Transfer data collect buffer contents to the data collector.
End flow;go to start of operation flow
Special transaction (cont).
S1

Figure C-10 Operation flow (12 of 15)



Special transaction (cont)

Was qualification code entered that of a cashier (42) or clerk (43) opening?

Is this a cashier opening?

Store the operator identification number for use during subsequent transactions and set up cashier operation mode.

Illuminate the DATE descriptor.

Is a new date to be entered?

Enter the desired date.

Store the date entered for use during subsequent operations.

Reset the have been offline flag.

Press the ENTER key.

Print the footer data.

Open the cash drawer.

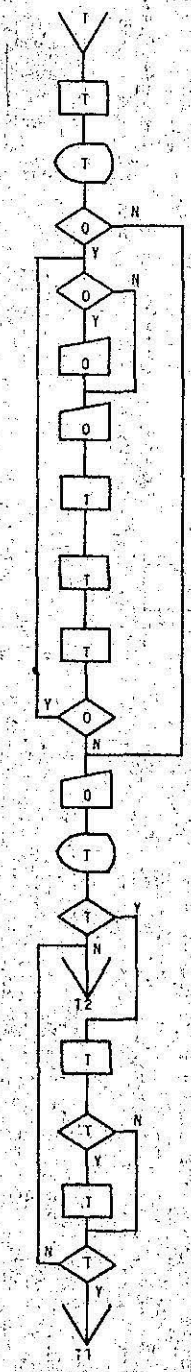
Transfer the data collect buffer contents to the data collector.

End flow go to start of operation flow.

Was qualification code entered that of a closing (44)?

Go to closing (44).

Go to programming (47).



Closing (44)

Open the cash drawer.

Illuminate the QTY / OR X PRICE descriptor.

Is cash count desired?

Is multiplication desired?

Index the quantity (0-99).

Enter the denomination or amount.

Multiply the denomination times the quantity (if a quantity was entered).

Print the quantity and the resulting amount (print a quantity of 1 if no quantity entered).

Add the amount to the taxable itemizer.

Are other denominations or checks to be counted?

Press the TOTAL key.

Display the contents of the taxable itemizer.

Is the READ or RESET keylock activated?

Go to end closing.

Print the sales and returns totals.

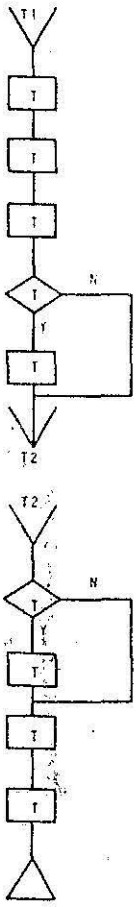
Is the 280 programmed to print the cash total?

Print the cash total.

Is the RESET keylock activated?

Go to reset.

Figure C-10 Operation flow (13 of 15)



Reset

Reset returns total.

Reset cash total.

Reset media count.

Is the 280 programmed to reset the sales total?

Reset the sales total.

Go to end closing.

End closing

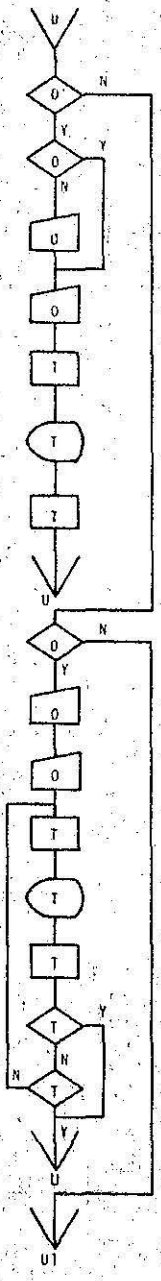
Has the 280 been offline since the last opening with a date entry?

Print slash marks.

Print the cash count total and footer data.

Transfer data collect buffer contents to the data collector.

End flow;go to start of operation flow.



Programming

Is read operation desired?

Is this advance/read?

Index the octal coded address of the location to be accessed.

Press the ENTER key.

Read data contained in location accessed.

Display and print the location and data (octal coded).

Increment the address by 1.

Go to programming.

Is core dump operation desired?

Index the starting address.

Press the SUBTOTAL key.

Read data from accessed location.

Display and print the location and data.

Increment the address by 1.

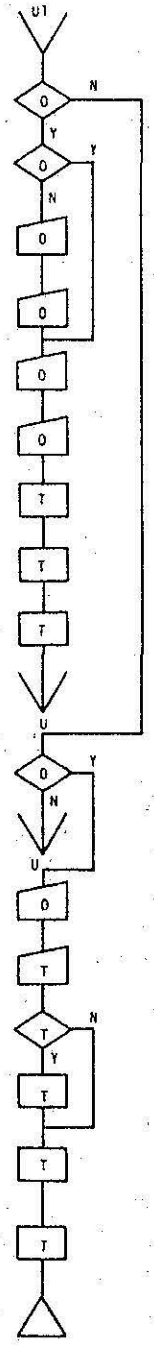
Any key pressed?

Is this the end of accessible locations?

Go to programming.

Go to programming (cont).

Figure C-10 Operation flow (14 of 16)



Programming (cont)

Is write operation desired?

Is this advance/write?

Index the address of the location to be written into.

Press the /FOR key.

Index the data to be written.

Press the PRICE CHANGE key.

Write the data into the accessed location.

Print the location and data.

Increment the address by 1.

Go to programming.

Is exit from programming desired?

Go to programming.

Press the TOTAL key.

Print the footer data.

Is the programmable cash drawer bit set?

Open the cash drawer.

Transfer data collect buffer contents to the data collector.

Calculate new CDV check digit on the contents of the read/write memory.

End flow;go to start of operation flow.

Figure C-10 Operation flow (15 of 15)

SECTION D
PROGRAMMING

INTRODUCTION

The 280 is tailored to a particular user application through programmability provided by the read/write memory. During operation of the 280, sequence control and application parameters are obtained from the read/write memory by the TCU module to complement the firmware. The TCU also uses certain areas of the read/write memory for temporary data storage and as work areas. The read/write memory provides a means of changing the unit application without requiring a change in the hardware (replacement of the TCU ROM board). The content of the read/write memory may be initially loaded or changed through the keyboard during the programming sequence. Programming may be performed by an operator, programmer, or Technical Service Representative. The Technical Service Representative may, through use of a diagnostic programming sequence, have access to a larger portion of the read/write memory than the operator or programmer; however, the permanent totals cannot be changed during any programming sequence.

The Technical Service Representative may also perform terminal address character programming. This programming is performed by positioning "C" clips on the TCU logic board. Since the cabinet must be removed for access to the TCU, terminal address character programming is not available to the operator or programmer.

MEMORY ORGANIZATION

The read/write memory is a core memory consisting of two sectors: sector "0" and sector "1". Each sector contains 256 eight-bit characters. An octal coded location of from 000 through 377 is assigned to each character within each sector. A word consists of a character or series of consecutive characters. Each word contains the necessary information for the terminal to perform a particular step of an operation or contains data pertinent to the overall operation.

The words contained in address locations 000 through 212 for sector "0" and 000 through 232 for sector "1" are accessible and changeable by the operator or programmer through the use of the programming sequence.

Figures D-1 and D-2 illustrate the word layouts for sectors "0" and "1". When using these figures, the octal coded location of a word is determined as follows. The numbers for the first two digits preceding the slash are associated with the left set of last digits. The numbers following the slash are associated with the right set of last digits. For example, the ID NO. TCW word occupies locations 003 through 005. The 2nd MDSE. TCW word occupies locations 011 through 013.

Refer to Tables D-5 and D-6 for detailed core maps of sectors "0" and "1" respectively.

OCTAL LOCATION - 1ST TWO DIGITS	OCTAL LOCATION - LAST DIGIT → 0	1	2	3	4	5	6	7 / 0	1	2	3	4	5	6	7
00/01	CONT. #4	COMM. TIME OUT	COV METH.	ID NO TCW			1ST MDSE. TCW		2ND MDSE. TCW			3RD MDSE. TCW			MISC. -
02/03	DATA TCW		QTY / PRICE TCW				NONMERCHANDISE TCW					DISCOUNT ID TCW			
04/05	DISCOUNT % TCW				FEE TYPE TCW		FEE AMOUNT TCW			MISC CREDIT TYPE TCW				MISC. CREDIT -	
06/07	AMOUNT TCW		DEPOSIT AMOUNT TCW				AMOUNT TENDERED TCW		ACCOUNT NUMBER TCW			MANUAL TAX TCW			DATE -
10/11	TCW		VOID TCW				CLOSING TCW		HEADER PRINT CONTROL TABLE			FOOTER PRINT CONTROL TABLE			AMT. PRT CONT.
12/13	TRL. PRT SLEW		QUAL. CHOICE TABLE				SLIP ENFORCE TABLE			MEDIA VALIDATION TABLE				MEDIA -	
14/15	COUNT TABLE		SLEW CONT.	COV MOD.	COV WEIGHTS										
16/17	COV WEIGHTS		AUTO DEPT. NO.		AUTO QUAL	ROUNDING CONSTANTS		AUTO DISCOUNT %	AUTO TAX %		OFF LINE CONT	DC CUTOFF	SEQ. FMT.	FLOOR LIMIT	
20/21	CONT. 1	CONT. 2	CONT. 3	STORE NUMBER		TERMINAL NUMBER		MAX SLIP LINES	NOT USED		CORE CHK DIGIT	761 OFF/L CODE	NOT USED	SLIP LINE COUNT	STORE -
22/23	ACCOUNT NO., WORK REGISTER 3, CCTR QUANTITY											STORE IND 1	RELINK	STORE QUAL CODE	STORE PRT CONT.
24/25	CORE FLAG 2	CORE FLAG 3	WORK REGISTER 1				WORK REGISTER 2			DEPOSIT TOTAL				NONTAXABLE -	
26/27	ITEMIZER		TAXABLE ITEMIZER				NOT USED								
30/31	NOT USED									OPERATOR ID NUMBER		CURRENT -			
32/33	DATE	CORE FLAG 1	723 OFF/L CODE	TRANS. COUNT		MEDIA COUNT	NOT USED								
34/35	NOT USED														
36/37	CASH TOTAL					RETURNS TOTAL			SALES TOTAL						TOTAL CONT.

Figure D-1 Word layout, sector "0"

OCTAL LOCATION - 1ST TWO DIGITS	OCTAL LOCATION - LAST DIGIT → 0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
00/01	MERCHANDISE			RETURN			PROGRAMMABLE MNEMONICS ERROR			SUBTOTAL			DISCOUNT			FEE
02/03	FEE			MISC.			PROGRAMMABLE MNEMONICS DEPOSIT			TAX			TOTAL			CREDIT
04/05	CRT.			AMT. TEND.			CHANGE DUE		PROGRAMMABLE MNEMONICS CHARGE				CASH			C.O.D.
06/07	LAYAWAY			VOID			PROGRAMMABLE MNEMONICS REC. ON ACCT.			CASH			RESET			NEG
10/11	TTL. CASH			RETURN			TOTAL SALES		PROGRAMMABLE MNEMONICS CASH COUNT				VOID			
12/13	DIAGNOSTIC						CHECK TEND.		PROGRAMMABLE MNEMONICS OFFLINE IND.			NOT TRANS.			MNEMONICS EXP	
14/15	MNEMONICS EXPANSION AND 761 LABEL															
16/17	MNEMONICS EXPANSION AND 761 LABEL															
20/21	MNEMONICS EXPANSION AND 761 LABEL															
22/23	NOT USED											CORE CHECK	761 DC BUFFER			
24/25	761 DC BUFFER								761 OR 723 DC BUFFER							
26/27	761 OR 723 DC BUFFER															
30/31	761 OR 723 DC BUFFER															
32/33	761 OR 723 DC BUFFER															
34/35	761 OR 723 DC BUFFER								761 DC BUFFER							
36/37	761 DC BUFFER														723 ODD CHAR.	SEC. CONT.

Figure D-2 Word layout, sector "1"

TRANSACTION CONTROL WORDS

Transaction control words (TCW) contain the information necessary to lead the operator through a transaction and direct the processing of the data in the terminal. The transaction control word consists of three or more characters and conforms to a basic format. In operation, the TCU accesses the first character of a transaction control word, performs the functions indicated by the content of the character and advances to the next character position in the word. The basic transaction control word format is illustrated in figure D-3.

BIT POSITIONS	8	7	6	5	4	3	2	1
1st CHARACTER	SKIP	OPERATOR INSTRUCTION Descriptor Row			ADDL. INST.	OPERATOR INSTRUCTION Descriptor Column		
ADDITIONAL INSTRUCTION CHARACTERS HAVE THE SAME FORMAT AS THE FIRST CHARACTER EXCEPT THAT BIT 8 IS IGNORED								
2nd CHARACTER	L/R JUSTIFY	PRINT LINE CONTROL		PRINT COLUMN ADDRESS				
3rd CHARACTER	CDV OPTION	CDV	DATA ENFORCE	/FOR KEY LOCKOUT	MAXIMUM FIELD SIZE			

Figure D-3 Transaction control word format

Operator Display

8	7	6	5	4	3	2	1
SKIP? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Row (Down) SEE FIGURE D-5			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column (Across) SEE FIGURE D-5		

Figure D-4 First character

FIRST CHARACTER

The first character of a transaction control word contains the skip bit, the operator instruction bits, and the additional instruction bit. See figure D-4.

When the skip bit (bit 8) is set (logic ONE), the terminal will skip the entire transaction control word and proceed to the next word.

The operator instruction bits (bits 1-3 and 5-7) contain the code that causes a particular instruction to be displayed on the operator display. Bits 1 through 3 (in binary) indicate the column and bits 5 through 7 (in binary) indicate the row of the descriptor to be illuminated. See figure D-5.

COLUMN

ROW	1	2	3	4	5	6
3	DISCOUNT 1	FEE 2	MISC. CR 3	CSH DEP-4 CHG DEP-5	DATA 6	JOURNAL LOW
4	DEPT	CLASS	MDSE. NO.	TAX EXCEPTION	ID NO.	AMOUNT TOTAL
2	TAX PERCENT	TRANS NO /TERM NO	QTY/ORX PRICE	AMT. TEND	DATE	CREDIT
6	COMM. ALERT	INSERT SLIP	PERCENT	ACCT. NO	AMOUNT	CHANGE DUE

Figure D-5 Operator display

The additional instruction bit (bit 4) of the first character being set indicates that the next sequential character contains another operator instruction to be displayed. This permits more than one operator instruction to be illuminated for the same transaction control word. The last character of the series of first character types has the additional instruction bit reset.

If the transaction control word is programmed for multiple operator instructions, bit 8 of the second and subsequent instruction characters is a "don't care" bit (ignored by the terminal).

SECOND CHARACTER

The second character of a transaction control word contains print control information. This print control information usually pertains to the data entered at the entry point indicated by the name of the transaction control word; however, the second character in some cases may contain print control information that is not related to the transaction control word. For example, all amount printing is controlled by the amount print control word (word 26). If the particular transaction control word is related to an amount entry, the second character of this word may be used to control printing of other information. The second character format is shown in figure D-6.

Bit 8 of the second character determines the right or left justification of print line data to the column address indicated by the lower five bits of this character.

Bit 8 set (1) – right justify

Bit 8 reset (0) – left justify

NOTE: If bit 8 is set (1), the column address is 29, and no data is entered, the terminal hangs up. This occurs because the firmware adds one to the column address than subtracts one each time a digit is indexed. When no data is entered, the effective column address is 30 which causes the printer to transfer a BUSY status to the TCU since 30 is an illegal column address. For this reason, when programming, bit 8 should be reset (0) when a column address of 29 is specified.

8	7	6	5	4	3	2	1
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL SEE TABLE D-1		PRINT COLUMN ADDRESS Column 0-29				

Figure D-6 Second character

Bits 6 and 7 of the second character control print line functions as shown in table D-1.

Table D-1 Print line functions

Bits		Print Line Function
b7	b6	
0	0	Load print buffer/no print
0	1	Load print buffer/print/feed one line
1	0	Load print buffer/print/no line feed
1	1	Load print buffer/print on journal only

Printing on the journal only causes the journal to advance one line. Also, the print buffer is cleared after printing.

Bits 1 through 5 of the second character contain the column address to which the data field is to be right or left justified. If left justify is selected by bit 8, the column address indicates the leftmost column of the data field; and if right justify is selected, the column address indicates the rightmost column of the data field. Column addresses are designated 0 through 29 starting at the left. This address is programmed in straight binary with bit 5 having a binary weight of 16, and bit 1 a weight of 1.

MNEMONICS FROM CHARACTER 064

Since the position of mnemonics is programmable, care should be taken to ensure that an alpha character is not followed immediately by a numeric character due to the timing limitations of the printer. A space should be programmed following alpha characters that are followed by numerics. Numerics may be followed by alpha characters with no adverse effect. The symbol (#) is considered a numeric character and should not be programmed to follow the mnemonics unless a space is inserted.

NOTE: If all eight bits of the second character are set (1), the data is loaded into the data collect buffer but not into the printer buffer. This results in the data being regarded as transparent by the 280.

THIRD CHARACTER

The third character of a transaction control word contains the parameters for the CDV weight option, CDV use option, data enforce, /FOR key lockout, and maximum field size of the data associated with the name of the transaction control word (refer to figure D-7).

Bit 8 of the third character determines which of the two sets of CDV weights and moduli are used to verify data associated with this transaction control word. When bit 8 is set (1) the left four bits (5-8) of the CDV weight character and the modulus are used. When bit 8 is reset (0), the right four bits (1-4) are used.

Bit 7 of the third character determines whether or not a CDV check is to be performed on the data entered at this transaction control word.

Bit 7 set (1) — Perform CDV checks on entered data

Bit 7 reset (0) — Do not perform CDV check

Bit 6 of the third character is the enforce data bit. If bit 6 is set (1), the terminal requires that at least one digit be entered before continuing the transaction sequence.

Bit 5 of the third character is the /FOR key lockout bit. If bit 5 is set (1), the use of the /FOR key is illegal at the data entry point associated with the name of the transaction control word.

Bits 1 through 4 of the third character contain the binary configuration of the maximum number of digits that may be entered for the associated data field. For example, this number is programmed to be six (0110) for the identification number transaction control word. If an identification number of seven digits is entered, an error occurs. The maximum number of digits that may be entered is 13 unless otherwise specified.

WORD DESCRIPTIONS

All words in the read/write memory are assigned word numbers. The word numbers are assigned consecutively starting with the first word in sector "0" and ending with the last word in sector "1". Each sector contains 256 octal coded locations, 000 through 377. Referenced locations refer to sector "0" unless otherwise specified. The word descriptions apply to all 280 International models (401/402/403/404). Notations are made where programming differences exist between models.

8	7	6	5	4	3	2	1
CDV OPTION (1) — Left set (0) — Right set	CDV CHECK? (1) — Yes (0) — No	DATA ENFORCED? (1) — Yes (0) — No	/FOR KEY ILLEGAL? (1) — Yes (0) — No	MAXIMUM FIELD SIZE 13 digits maximum			

How to put something in

Figure D-7 Third character

SECTOR "0" WORD DESCRIPTIONS

WORD 1
OPTION CONTROL #4 (LOCATION 000)

This word is used to control the following terminal functions.

Multiple Discounts — If bit 8 is set (1), only one discount is allowed. If bit 8 is reset (0), multiple discounts are allowed.

Pick-up Slip Feature — If bit 7 is set (1), the pick-up slip print feature is enabled which permits the user to record, on a slip inserted during merchandise item entry, the data concerning an item to be picked up in another area of the store. When more than one item is to be recorded on a pick-up slip, the slip must be manually spaced by the operator. If bit 7 is reset (0), the pick-up slip print feature is disabled.

Floor Limit and Credit Authorization Abort Lockout — If bit 6 is set (1), and the terminal determines the floor limit has been exceeded, an abort at this point is locked out. If credit authorization is in effect, and a response code is displayed, an abort at this point is locked out unless the response code is a 7 in which case the terminal automatically aborts when a 7 is entered from the keyboard.

Communications Timer — The state of bit 5 indicates that either the 100 millisecond or the 5.1 second timer is to be used by the terminal while waiting for acknowledgment of input message receipt from the central file during credit authorization sequences. Refer to Data Collection section. Bit 5 is a "don't care" bit when using the 761 for data collection.

Bit 5 set (1) — 5.1 second timer

Bit 5 reset (0) — 100 msec. timer

Open Cash Drawer Operation — If bit 4 is set (1), open cash drawer operation is allowed.

Selective Communications — If bit 3 is set (1), selective communications is in effect. Selective communications means that data entered on a short merchandise sequence is not stored in the DC buffer and therefore is not transmitted.

Alternate Sequence — Programming of bits 1 and 2 is as follows.

Bit 2	Bit 1	
0	0	Alternate sequence locked out
1	0	Alternate sequence locked out
1	1	Primary sequence is long
0	1	Primary sequence is short

WORD 2
COMMUNICATION TIME OUT (LOCATION 001)

The communication time out word is a single character contained in location 001. This word contains two programmable time outs, the line establishment time out and the credit authorization turnaround time out. This word is applicable only when using the 723 for data collection.

The line establishment time out is programmable to permit from 4 to 60 seconds to elapse while the terminal attempts to establish a communications path to the data collector or central file before going into offline mode. Bits 5 through 8 are used to program this time out in increments of 4 seconds each. Following is a list of the time outs available.

b8	b7	b6	b5	TIME OUT
0	0	0	0	Do not program (refer to note).
0	0	0	1	4 seconds
0	0	1	0	8 seconds
0	0	1	1	12 seconds
0	1	0	0	16 seconds
0	1	0	1	20 seconds
0	1	1	0	24 seconds
0	1	1	1	28 seconds
1	0	0	0	32 seconds
1	0	0	1	36 seconds
1	0	1	0	40 seconds
1	0	1	1	44 seconds
1	1	0	0	48 seconds
1	1	0	1	52 seconds
1	1	1	0	56 seconds
1	1	1	1	60 seconds

NOTE: If bits 5 through 8 are reset (0), the time out becomes 17 minutes and 4 seconds.

In programming the line establishment time out, allow approximately 1 second for each terminal per data collector. For example, if there are 29 terminals connected to a single data collector, 32 seconds should be programmed as an initial setting. This is an approximate time out setting that may be altered according to the work load of the terminals.

The credit authorization turnaround time out is programmable to permit from 3 to 45 seconds to elapse while the terminal waits for an output message from the central file once an input message has been sent and acknowledged. Bits 1 through 4 are used to program this time out in increments of 3 seconds each. Following is a list of the time outs available.

b4	b3	b2	b1	TIME OUT
0	0	0	0	Do not program (refer to note).
0	0	0	1	3 seconds
0	0	1	0	6 seconds
0	0	1	1	9 seconds
0	1	0	0	12 seconds
0	1	0	1	15 seconds
0	1	1	0	18 seconds
0	1	1	1	21 seconds
1	0	0	0	24 seconds
1	0	0	1	27 seconds
1	0	1	0	30 seconds
1	0	1	1	33 seconds
1	1	0	0	36 seconds
1	1	0	1	39 seconds
1	1	1	0	42 seconds
1	1	1	1	45 seconds

NOTE: If bits 1 through 4 are reset (0), the time out becomes 12 minutes and 48 seconds.

WORD 3
CDV METHOD, QUALIFICATION DATA ENFORCE, AND TAX EXCEPTION CODE (LOCATION 002)

Bits 7 and 8 of this word determine if the CDV calculation, when programmed, is performed by product digit addition or product addition. Bit 7 controls the right set of CDV weights and modulus and bit 8 controls the left set. If the bit is set (1) the product digit addition method is used. If the bit is reset (0), the product addition method is used.

Bit 6 is used for enforced data for qualification code entry. If bit 6 is set (1), data is enforced. If bit 6 is reset and the ENTER key only is pressed at the qualification code entry point, the terminal goes to word 36 to access the automatic qualification code.

Bits 1 through 5 contain the print column address, in binary, of the tax exception symbol (#).

WORD 4
ID NUMBER AND MINIMUM FLOOR LIMIT TCW (Locations 003-005)

8	7	6	5	4	3	2	1	
Don't Care	OPERATOR INSTRUCTION Descriptor Row 4			Must be (0)	OPERATOR INSTRUCTION Descriptor Column 5			003
MINIMUM FLOOR LIMIT (0-$99) MIN $ VALUE BEFORE CREDIT AUTH NECESSARY ID number print position controlled in header and footer print tables. This character effective only when using 723 for data collection.								004
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK? (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 6 digits maximum				005

WORD 5
FIRST MERCHANDISE TCW (LOCATIONS 006-010)

8	7	6	5	4	3	2	1	
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			006
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL			PRINT COLUMN ADDRESS Column 0-29				007
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK? (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 13 digits maximum				010

WORD 6
SECOND MERCHANDISE TCW
(LOCATIONS 011-013)

8	7	6	5	4	3	2	1	
SKIP? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			011
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL			PRINT COLUMN ADDRESS Column 0-29				012
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK? (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 13 digits maximum				013

WORD 7
THIRD MERCHANDISE TCW
(LOCATIONS 014-016)

8	7	6	5	4	3	2	1	
SKIP? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			014
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL			PRINT COLUMN ADDRESS Column 0-29				015
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK? (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 13 digits maximum				016

WORD 8
MISCELLANEOUS DATA TCW
(LOCATIONS 017-021)

8	7	6	5	4	3	2	1	
SKIP? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			017
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL		PRINT COLUMN ADDRESS Column 0-29					020
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK? (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 13 digits maximum				021

WORD 9
QUANTITY/PRICE TCW (LOCATIONS 022-024)

8	7	6	5	4	3	2	1	
Must be (0)	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			022
DECIMAL POINT KEY LEGAL? (1) – Yes (0) – No (Note 1)	ITEM EXTENSION FOR TAG READING? (1) – Yes (0) – No	Don't Care	PRINT COLUMN ADDRESS Column 0-29 Address specified will be for tens digit of quantity even if it is space. Right justified.					023
Don't Care	Don't Care (Note 4)	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No (Note 3)	MAXIMUM FIELD SIZE 12 digits max. if 4-digit qty. is legal. 10 digits max. if 4-digit qty. is illegal. Includes digits in quantity and price plus one for "X" key. (Note 2)				024

1. For the 1/2 Penny model, bit 8-location 023 is used to determine if two or four digit quantity is in effect. If bit 8 is set (1), four digit quantity is in effect. If bit 8 is reset, two digit quantity is in effect.
2. Price is limited to seven digits (not programmable).
3. If the /FOR key is programmed illegal, package price cannot be entered.
4. For the 1/2 Penny model, bit 7-location 024 is used for 1/2 Penny key legalization for price amount. If bit 7 is set (1), the key is illegal. If bit 7 is reset (0), the key is legal.

WORD 10
NON-MERCHANDISE TCW (LOCATIONS 025-033)

8	7	6	5	4	3	2	1	
Don't Care	OPERATOR INSTRUCTION Descriptor Row			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column			025 Disc
Don't Care	OPERATOR INSTRUCTION Descriptor Row			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column			026 Fee
Don't Care	OPERATION INSTRUCTION Descriptor Row			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column			027 Misc 3
Don't Care	OPERATOR INSTRUCTION Descriptor Row			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column			030 Cash Dep 925
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			031 Data
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL			PRINT COLUMN ADDRESS Column 0-29				032
Don't Care	Don't Care	Don't Care	Must be (1)	MAXIMUM FIELD SIZE 1 digit maximum				033

The operator instructions must be programmed in the following order: Discount, Fee, Miscellaneous Credit, Deposit, and Data. If instead of programming an instruction as above, zeros are programmed for an instruction, that particular functional flow will be locked out (Illegal). If the function is to be locked out by programming the instruction bits zero, bit 8 must also be zero or the function will be operable even though the descriptor is not illuminated.

WORD 11
DISCOUNT ID TCW (LOCATIONS 034-037)

8	7	6	5	4	3	2	1	
SKIP? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Row			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column			034
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			035
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL		PRINT COLUMN ADDRESS Column 0-29					036
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 13 digits maximum				037

WORD 12
DISCOUNT PERCENT TCW (LOCATIONS 040-043)

8	7	6	5	4	3	2	1	
Must be (0)	OPERATOR INSTRUCTION Descriptor Row			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column			040
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			041
DECIMAL POINT KEY LEGAL? (1) – Yes (0) – No (Note 1)	Don't Care	Don't Care	PRINT COLUMN ADDRESS Column 0-29 Used for percentages – keyboard and stored.					042
Don't Care	Don't Care	DATA ENFORCED? (1) – Yes (0) – No (Note 2)	Must be (1)	MAXIMUM FIELD SIZE 4 digits if 4-digit % is legal. 2 digits if 4-digit % is illegal.				043

1. For the 1/2 Penny model, bit 8-location 042 is used to determine if two or four digit discount percent is in effect. If bit is set (1), four digit percent is in effect. If bit is reset (0), two digit percent is in effect.

2. If bit 6-location 043 is reset (0) and the ENTER key is pressed without entering a percent, the stored discount percent will be used.

WORD 13
FEE TYPE TCW (LOCATIONS 044-046)

8	7	6	5	4	3	2	1	
SKIP? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			044
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL		PRINT COLUMN ADDRESS Column 0-29					045
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK? (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 13 digits maximum				046

WORD 14
FEE AMOUNT TCW (LOCATIONS 047-052)

8	7	6						
Must be (0)	OPERATOR INSTRUCTION Descriptor Row			(1) Yes (0) No	OPERATOR INSTRUCTION Descriptor Column			050
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			050
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL		IF OTHER THAN 317 AN ADDITIONAL SPACE OCCURS DURING TAG READING.	PRINT COLUMN ADDRESS All 8 bits in location 051 are used for control of printing transparent data from color coded tags.				051
Don't Care	Don't Care (Note 1)	DATA ENFORCED? (1) – Yes (0) – No	Must be (1)	MAXIMUM FIELD SIZE 7 digits maximum				052

1. For the 1/2 Penny model, bit 7-location 052 is used for 1/2 Penny key legalization for a fee amount. If the bit is set (1), the key is illegal. If the bit is reset (0), the key is legal.

WORD 15
MISCELLANEOUS CREDIT TYPE TCW (LOCATIONS 053-055)

8	7	6	5	4	3	2	1	
SKIP? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			053
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL			PRINT COLUMN ADDRESS Column 0-29				054
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK? (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 13 digits maximum				055

WORD 16
MISCELLANEOUS CREDIT AMOUNT TCW (LOCATIONS 056-061)

8	7	6	5	4	3	2	1	
Must be (0)	OPERATOR INSTRUCTION Descriptor Row			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column			056
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			057
DECIMAL POINT KEY LEGAL FOR TAX %? (1) – Yes (0) – No (Note 1)	Don't Care	Don't Care	PRINT COLUMN ADDRESS Column 0-29 Used for tax % – keyboard and stored.					060
Don't Care	Don't Care (Note 2)	DATA ENFORCED? (1) – Yes (0) – No	Must be (1)	MAXIMUM FIELD SIZE 7 digits				061

1. For the 1/2 Penny model, bit 8-location 060 is used in conjunction with bit 8-076 to determine the manner in which tax is to be entered. The two bits must be programmed as follows.

Location 060 bit 8	Location 076 bit 8	
0	0	2 digit manual tax percent
1	0	4 digit manual tax percent
0	1	Tax amount entry

If both bits are programmed set (1's) and a manual tax amount is entered, the resulting tax amount will be incorrect.

2. For the 1/2 Penny model, bit 7-location 061 is used for 1/2 Penny key legalization for miscellaneous credit amount. If the bit is set (1), the key is illegal. If the bit is reset (0), the key is legal.

WORD 17
DEPOSIT AMOUNT TCW (LOCATIONS 062-065)

8	7	6	5	4	3	2	1	
Must be (0)	OPERATOR INSTRUCTION Descriptor Row			ADDL. INST.? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Column			062
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			063
Don't Care	Don't Care	Don't Care	PRINT COLUMN ADDRESS Column 0-29 Used for merchandise entry mnemonics.					064
Don't Care	Don't Care (Note 1)	DATA ENFORCED? (1) – Yes (0) – No	Must be (1)	MAXIMUM FIELD SIZE 7 digits maximum				065

1. For the 1/2 Penny model, bit 7-location 065, is used for 1/2 Penny key legalization for deposit amount. If the bit is set (1), the key is illegal. If the bit is reset (0), the key is legal.

WORD 18
AMOUNT TENDERED TCW (LOCATIONS 066-070)

8	7	6	5	4	3	2	1	
SKIP? (1) – Yes (0) – No	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			066
JUSTIFY (1) – Right (0) – Left (Note 2)	PRINT LINE CONTROL		PRINT COLUMN ADDRESS Column 0-29 All 8 bits of location 067 used for printing of check number. (Note 1)					067
MULTIPLE CHECKS ALLOWED? (1) – Yes (0) – No	Don't Care (Note 4)	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No (Note 3)	MAXIMUM FIELD SIZE 8 digits maximum. Applies to amount tendered only. Check number is limited to 12 digits by firmware.				070

1. If check authorization is used, column address must be 3 or more. The # sign is printed 3 columns to the left of the address specified and the code is printed 2 columns to the left.
2. Justify bit must be (0) if check authorization is used.
3. If /FOR key is programmed illegal, check numbers cannot be entered for checks tendered.
4. For the 1/2 Penny model, bit 7-location 070 is used for 1/2 Penny key legalization for amount tendered. If the bit is set (1), the key is illegal. If the bit is reset (0), the key is legal.

WORD 19
ACCOUNT NUMBER TCW (LOCATIONS 071-073)

8	7	6	5	4	3	2	1	
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			071
JUSTIFY (1) – Right (0) – Left (Note 2)	PRINT LINE CONTROL		PRINT COLUMN ADDRESS Column 0-29. (Note 1)					072
CDV OPTION (1) – Left set (0) – Right set	CDV CHECK? (1) – Yes (0) – No	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 14 digits maximum				073

1. If credit authorization or floor limit is used, the column address must be 3 or more. The # sign is printed 3 columns to the left of the specified address and the credit status code is printed 2 columns to the left.
2. Justify bit must be (0) if credit authorization or floor limit is used.

WORD 20
MANUAL TAX TCW (LOCATIONS 074-076) Word 99 location 200 to remove tax option completely.

8	7	6	5	4	3	2	1	
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			074
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL		PRINT COLUMN ADDRESS Column 0-29 All 8 bits of location 075 are used for printing of tax code.					075
AMOUNT OR % TAX ENTRY? (1) – Amount (0) – % (Notes 3 & 4)	Don't Care (Note 5)	DATA ENFORCED? (1) – Yes (0) – No (Note 2)	/FOR KEY ILLEGAL? (1) – Yes (0) – No (Note 1)	MAXIMUM FIELD SIZE 7 digits for tax amount. 2 or 4 digits for tax % depending on legality of 2 or 4 digit entries. Tax code limited to 13 digits by firmware.				076

1. If /FOR key is programmed illegal, tax code cannot be entered.

2. The data enforce bit must be programmed (0) for the "auto or manual" and "auto and manual or auto" tax options. The bit must be programmed (1) for the "manual only" and "auto and manual" options.

3. When programming for an amount entry, the decimal point key must be programmed illegal (bit 8-060). If the decimal point key is legal and pressed, the digits entered will be treated as percent even though bit 8-076 is a (1).

4. For the 1/2 Penny model, bit 8-076 is used in conjunction with bit 8-060 to determine the manner in which tax is to be entered. The two bits must be programmed as follows.

Location 060 Bit 8	Location 076 Bit 8	
0	0	2 digit manual tax percent entry
1	0	4 digit manual tax percent entry
0	1	Tax amount entry.

If both bits are programmed set (1) and a manual tax amount is entered, the resulting tax amount will be incorrect.

5. For the 1/2 Penny model, bit 7-location 076 is used for 1/2 Penny key legalization for manual tax amount. If the bit is set (1), the key is illegal. If the bit is reset (0), the key is legal.

WORD 21
DATE TCW (LOCATIONS 077-101)

8	7	6	5	4	3	2	1	
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			077
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL		PRINT COLUMN ADDRESS Column 0-29					100
Don't Care	Must be (0)	DATA ENFORCED? (1) – Yes (0) – No (Note 1)	Must be (0)	MAXIMUM FIELD SIZE 8 digits maximum				101

1. When bit 6-location 101 is set (1), data is enforced and the "have been offline" flag will be reset. When bit 6 is reset (0) and data is not entered prior to pressing the ENTER key, the date will remain the same and the "have been offline" flag will not be reset.

WORD 22
TRANSACTION VOID TCW (LOCATIONS 102-104)

8	7	6	5	4	3	2	1	
Don't Care	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			102
JUSTIFY (1) – Right (0) – Left	PRINT LINE CONTROL (Note 1) Should be (1) (0)		PRINT COLUMN ADDRESS Column 0-29					103
Don't Care	Must be (0)	DATA ENFORCED? (1) – Yes (0) – No	/FOR KEY ILLEGAL? (1) – Yes (0) – No	MAXIMUM FIELD SIZE 13 digits maximum				104

1. This word is also used to control entry of transaction number and terminal number in the re-entry mode. Therefore, the print line control should be programmed for no line feed.

Word 23 closing TCW. Location (105 - 107)

8	7	6	5	4	3	2	1	
don't care.	OPERATOR INSTRUCTION Descriptor Row			Must be (0)	OPERATOR INSTRUCTION Descriptor Column			105
Must be (0)	Don't Care	Don't Care		PRINT COLUMN ADDRESS Column 0-29 Used for printing of quantity entered during cash count?				106
Don't Care	Don't Care (Note 1)	Must be (0)	Must be (0)	MAXIMUM FIELD SIZE 10 digits maximum				107

1 For the 1/2 Penny model, bit 7-location 107 is used for 1/2 Penny key legalization for entering monetary amounts during a cash count in a closing transaction. If the bit is set (1), the key is illegal. If the bit is reset (0), the key is legal.

WORD 24
HEADER PRINT CONTROL TABLE
(LOCATIONS 110-113)

This word controls the printing of the header which may contain up to four of the following data fields.

- Transaction number/media number (maximum of 9 print columns).
- Terminal number (maximum of 4 print columns).
- Store number (maximum of 4 print columns).
- Operator I.D. number (maximum of 6 print columns).
- Date (maximum of 8 print columns).
- Type of transaction (maximum of 3 print columns plus number of mnemonic characters used).

This word indicates the sequence and starting print column of each data field.

The first character designates the first field to be printed, the second character designates the second field, etc. Each character is partitioned as shown in figure D-8.

8 4 2 1

b8	b7 b6 b5	b4 b3 b2 b1
Last field bit	Field designator code	Print column information

Figure D-8. Character partitioning

The state of the last field bit (bit 8) indicates whether or not this is the last field to be printed. If bit 8 is reset (0), the following character is presumed to contain a data field. If bit 8 is set (1), the data field in that same character is the last field to be printed.

Bits 5 through 7 contain the field designator code of the field to be printed. These code configurations are the following.

CODE FIELD

b7	b6	b5	
0	0	1	Transaction No./Media No.
0	1	0	Terminal No.
0	1	1	Store No.
1	0	0	I.D. No.
1	0	1	Date
1	1	0	Transaction Type

Bits 1 through 4 contain print column information which designate the starting print column. All data is left justified to the starting print column. The first character of the header print control word contains the actual starting print column from 0 through 15 (code 0000 starts in column 0). The starting column for the second field is derived by accumulating the column difference between the starting column of the first field and the starting column of the second field. This difference is programmed into bits 1 through 4 of the second character. The same procedure is followed to determine the starting position of the third and fourth field with each field using the previous field as a basis.

Table D-2 depicts the configuration programmed to cause a typical header print.

Table D-2 Header print control example

LOCATION	CONFIGURATION								FIELD	STARTING COLUMN
	b_8	b_7	b_6	b_5	b_4	b_3	b_2	b_1		
110	0	0	1	1	0	0	0	0	Store No.	0
111	0	0	1	0	0	1	1	0	Terminal No.	6
112	0	0	0	1	0	1	1	0	Transaction No./ Media No.	12
113	1	1	0	0	1	0	1	1	ID No.	23

WORD 25
FOOTER PRINT CONTROL TABLE
(LOCATIONS 114-116)

This word is formatted the same as the header print control word with the difference being that this word may contain only three of the six data fields. The programming criteria is identical to that of the header print control word. The transaction total is also printed in the footer line but is under control of the amount print control word.

NOTE: Care must be exercised to ensure that programmed fields do not overlay the amount field.

WORD 26
AMOUNT PRINT CONTROL
(LOCATION 117)

This word controls the printing of all monetary amounts. The word is formatted exactly as is the second character of the transaction control word. See figure D-6.

WORD 27
TRAILER PRINT SLEW LINES
(LOCATION 120)

Bits 5 through 8 of this character contain, in binary, the number of print line spaces to be skipped between the account number and the first footer print line. Bits 1 through 4 contain, in binary, the number of print line spaces to be skipped, less one, between footer print line one and footer print line two. If bits 1-4 are programmed 1111 (15), 14 line spaces will be skipped.

WORD 28
QUALIFICATION CHOICE TABLE
(LOCATIONS 121-125)

The qualification choice table is made up of five characters contained in locations 121 through 125 of the read/write memory. The qualification code entered through the keyboard is looked up in this table to determine if the code is acceptable to the terminal. The most significant digit of the qualification code (0-4) selects a particular character of the table. Digits 0 through 4 correspond to locations 121 through 125. The least significant digit of the qualification code (0-7) selects a particular bit position within the character selected by the most significant digit. Least significant digits 0 through 7 correspond to bit positions 8 through 1 as read from left to right.

If the bit is reset (0) in the selected position, the qualification code is legal and accepted by the terminal. If the bit selected is set (1), the qualification code is not accepted and an error results.

Table D-3 contains a typically programmed configuration of the qualification choice table.

Table D-3 Qualification choice table

		LSD							
		0	1	2	3	4	5	6	7
MSD	LOCATION	b_8	b_7	b_6	b_5	b_4	b_3	b_2	b_1
0	121	1	0	0	0	0	0	0	0
1	122	0	0	0	0	1	1	1	1
2	123	0	0	0	0	1	1	0	0
3	124	0	1	0	0	1	1	0	0
4	125	1	1	0	0	0	0	1	X

NOTE: Bit 1 of location 125 is a "don't care" bit and does not lockout the programming qualification code (47).

WORD 29
SLIP ENFORCE TABLE
(LOCATIONS 126-131)

This word uses the same format as the qualification choice table and denotes slip enforcement by transaction type. The qualification codes 40 through 47 do not access this table.

If the bit position selected by the qualification code is set (1), the associated transaction enforces slip usage at the beginning of a transaction. If the bit is reset (0), a slip is not required.

WORD 30
MEDIA VALIDATION TABLE
(LOCATIONS 132-135)

This word contains the bits used to permit the terminal to validate media by transaction type. Bits within the validation table are selected in the same manner as in the slip enforce table with qualification codes 40 through 47 being disregarded.

If the bit position selected is set (1), validation printing occurs; and if reset (0), validation printing does not occur.

NOTE: If the slip is enforced and validation printing is to occur on the same transaction, the header print line is omitted during the validation.

WORD 31
MEDIA COUNT TABLE
(LOCATIONS 136-141)

This word is formatted the same as the slip enforce table. The bits within this word determine whether or not the media count is incremented and are selected by transaction type.

If the bit position selected is set (1), the media count is incremented by one; and if reset (0), the media count is not incremented.

WORD 32
HEADER/BODY/ACCOUNT NO. SPACING
(LOCATION 142)

This word controls the number of slip lines slewed from the header to the body data and from the body to the account number.

Bits 1 through 4 contain, in binary, the number of print line spaces to be skipped, plus one, between the header and body print lines. If bits 1-4 are programmed 1111 (15), 16 line spaces will be skipped.

Bits 5 through 8 contain, in binary, the number of print line spaces to be skipped between the last possible print line of the body and the account number print line.

WORD 33
CDV MODULUS (LOCATION 143)

This word contains the modulus (divisor) to be used with the CDV weights for CDV calculations. Bits 1 through 4 contain the modulus number, in binary, to be used with the right set of CDV weights (bits 1 through 4 of locations 144 through 161). Bits 5 through 8 contain the modulus number, in binary, to be used with the left set of CDV weights (bits 5 through 8 of locations 144 through 161). The modulus number can be 10 or 11 for each set of CDV weights.

WORD 34
CDV WEIGHTS (LOCATIONS 144-161)

This word contains the check digit verification weights (multipliers). The weights can have values of from 0 through 9. There are two sets of weights used by the terminal: right and left. The right set is contained in bits 1 through 4 of each location. The left set is contained in bits 5 through 8 of each location. The set of weights to be used in a CDV check is selected by the transaction control word.

CDV weights are assigned starting with location 144 for the units digit of the number to be checked. Location 145 contains the weights for the tens digit, location 146 for the hundreds digit, etc. The method of CDV check is determined by the state of bits 7 and 8 of word 3.

WORD 35
AUTOMATIC DEPARTMENT NUMBER (LOCATIONS 162-163)

This word contains the automatic department number in packed BCD form. If the enforce data bit of the department number transaction control word is reset (0) and only the ENTER key is pressed, the terminal accesses this word to obtain the department number. The least significant digit of the department number is stored in bits 1-4 of location 163. The most significant digit is stored in bits 5-8 of location 162.

WORD 36
AUTOMATIC QUALIFICATION (LOCATION 164)

This word contains the automatic qualification code in packed BCD form. If the qualification enforce data bit (bit 6-location 002) is reset (0) and only the ENTER key is pressed, the terminal accesses this word to obtain the qualification code. The least significant digit of the code is stored in bits 1-4.

WORD 37
ROUNDING CONSTANTS (LOCATIONS 165-166)

Rounding constants are used to round monetary amounts to the nearest penny, nickel, dime, 1/2 Penny, and to whole unit numbers. Rounding occurs on all monetary amounts processed by the 280, including keyboard entries. Two characters in core, locations 165 and 166 octal are used to store the constants. The following chart shows the constants, in octal, to be used according to the rounding off amounts desired.

Amount	Location	
	165	166
Penny and Unit (No decimal)	000	120
Nickel and 1/2 Penny	002	120
Dime	005	000

WORD 38
AUTOMATIC DISCOUNT PERCENT (LOCATIONS 167-170)

This word contains the automatic discount percent in packed BCD form. If the enforce data bit of the discount percent transaction control word is reset (0) and only the ENTER key is pressed, the terminal accesses this word to obtain the discount percent. Discount percents from 00.01 to 99.99 are allowed. The least significant digit of the decimal amount is stored in bits 1-4 of location 170. The most significant digit of the whole number is stored in bits 5-8 of location 167.

WORD 39
TAX PERCENT (LOCATIONS 171-172)

This word contains the tax percent used in calculating automatic tax. The percent is stored in packed BCD form. Tax percents from 00.01 to 99.99 are allowed. The least significant digit of the decimal amount is stored in bits 1-4 of location 172. The most significant digit of the whole number is stored in bits 5-8 of location 171.

WORD 40
RST, OFFLINE CODE CONTROL, AND AUDIO OFFLINE INDICATION (LOCATION 173)

Bits 1 through 5 of this word contain the print column address for the RST mnemonics and the offline code. Bits 6 and 7 are "don't care" bits. Bit 8, when set (1) and the terminal is offline, will cause an audible indication to be given at the end of a transaction to alert the operator that the terminal is operating offline. When bit 8 is reset (0), the audible offline indication is not provided.

WORD 41
DATA COLLECT BUFFER CUTOFF (LOCATION 174)

The DC buffer accepts data as it is entered, until a pre-established cutoff point is reached. The firmware checks to see if the cutoff point has been reached at the end of each merchandise data entry sequence and each nonmerchandise entry sequence. If the cutoff point is reached, when checked, a buffer full condition is indicated and the data stored in the buffer is transferred to the 723 or 761. The content of the data collect buffer is transferred to the 723 or 761 at the end of each special entry and end transaction sequence, without regard to the cutoff point. If the cutoff point is not exceeded when checked, the 280 accepts and loads another merchandise or nonmerchandise data entry sequence into the data collect buffer. The cutoff point is programmable to permit the largest merchandise or

nonmerchandise data entry sequence to be loaded into the buffer without exceeding the buffer capacity when the loading starts at a location just before the cutoff point.

The method used to calculate the DC buffer cutoff character depends on the type of data collector used. For the 723, the DC buffer stores data in packed hexadecimal form, resulting in two digits per core location. For the 761, the DC buffer stores data in ASCII form, resulting in one digit per core location.

For 723 data collection, determine the largest number of digits to be entered at one time as on a tag read or merchandise entry. Divide this number by 2 and then add one. This is the number of locations required in core to store the largest item entry. Subtract the number obtained from 228 (344 octal – last location of DC buffer) and convert the result to octal form. This is the DC buffer cutoff character.

For 761 data collection, determine the largest number of digits to be entered at one time as on a tag read or merchandise entry. This is the number of locations required in core to store the largest item entry. Subtract this number from 253 (375 octal – last location of DC buffer) and convert the result to octal form. This is the DC buffer cutoff character.

WORD 42
SEQUENCE FORMAT CHARACTER
(LOCATION 175)

This word contains the format character code used by the data processor for identifying the data entry sequence. Anytime two entries are interchanged (such as class and merchandise number) this code must also be changed to indicate to the processor that there is a different data entry sequence. It is not necessary to change the format code if an entry is skipped since a missing data field is indicated to the processor. The format codes illustrated in table D-4 are examples only and may be changed to meet customer requirements.

Table D-4 Keyboard entry format codes

FORMAT CODE	DATA SEQUENCE
00	Department number Class Merchandise number Quantity/Price
10	Department number Merchandise number Class Quantity/Price
11	Class Department number Merchandise number Quantity/Price
12	Class Merchandise number Department number Quantity/Price
13	Merchandise number Department number Class Quantity/Price
14	Merchandise number Class Department number Quantity/Price

This code is programmed in BCD with the most significant digit being contained in bits 5 through 8 and the least significant digit contained in bits 1 through 4.

When a color coded tag is read, the format code from the tag is loaded into the data collect buffer, and the format code in word 42 is ignored.

WORD 43
FLOOR LIMIT (LOCATIONS 176-177)

This word contains, in packed BCD form, the whole dollar amount of the floor limit. The floor limit is used to authorize credit, if the feature is selected, when the amount of sale is equal to or below the amount programmed ($0000-$9999) in this word. Refer to word 44 for information on selecting this feature. This feature can be used with and without the credit authorization feature.

WORD 44
OPTION CONTROL #1
(LOCATION 200)

This word is programmed to control the use of the following terminal functions.

Floor Limit – Bit 8 determines the use of word 43 (location 177) as a floor limit. If bit 8 is set (1), the terminal is able to use the floor limit option. If bit 8 is reset (0), the terminal is unable to use the floor limit type of credit authorization.

Check Endorse – The state of bit 7 of this word determines the use of the check validation option. If bit 7 is set (1), check validation may be performed. If bit 7 is reset (0), check validation is not able to be performed by the terminal.

X Key Lock Out at First Merchandise Word – With bit 6 set (1) the use of the X key is locked out at the first merchandise word which prevents initiating a miscellaneous data sequence. However, the X key may still be used for entering a quantity before reading a color code tag. If bit 6 is reset (0), the entry to the miscellaneous data sequence is permitted when the X key is pressed at the first merchandise word.

Discount Both Itemizers – When Bit 5 is set (1), the terminal automatically calculates discounts on both the taxable and nontaxable itemizers. If bit 5 is reset (0) discount is performed on only one itemizer. This bit must be programmed reset (0) for models using the 761 for data collection.

END MDSE END RETURNS Key Lockout at the Nonmerchandise Selection Word – When Bit 4 is set (1), the END MDSE END RETURNS key is locked out at the nonmerchandise selection word (word 10). If bit 4 is reset (0), pressing the END MDSE END RETURNS key at the nonmerchandise selection word causes the terminal to return to the first merchandise word.

Programmable Cash Drawer – When bit 3 is set (1), the cash drawer opens only for the following transactions.

1. Any cash transaction or a charge transaction with a cash deposit.
2. An opening transaction.
3. A closing transaction.
4. A no sale transaction.

Manual Tax Only (MTO) – If this option is desired, both bits 1 and 2 must be reset (0) and the data enforce bit in the manual tax word must be set (1).

Manual or Automatic Tax (M or A Tax) – If this option is desired, both bits 1 and 2 must be reset (0) and the data enforce bit in the manual tax word must be reset (0).

Automatic Tax Only (ATO) – If this option is desired, bit 2 must be reset (0) and bit 1 must be set (1).

No Tax – If this option is desired, bit 2 must be set (1) and bit 1 must be reset (0).

Manual and Automatic Tax (M and A TAX) – If this option is desired, both bits 1 and 2 must be set (1) and the data enforce bit in the manual tax word must be set (1).

Manual and Automatic or Automatic Tax Only (M and A or ATO) – If this option is desired, both bits 1 and 2 must be set (1) and the data enforce bit must be reset (0) in the manual tax word.

WORD 45
OPTION CONTROL #2
(LOCATION 201)

If bit 1 is programmed reset (0), pressing the END MDSE/END RTN key when going from the merchandise to the nonmerchandise sequence will result in the subtotal amount being displayed and printed. Pressing the SUBTOTAL key at any time causes the subtotal amount to be displayed only.

If bit 1 is programmed set (1), pressing the END MDSE/END RTN key when going from the merchandise to the nonmerchandise sequence will result in the subtotal amount being displayed but not printed. However, pressing the SUBTOTAL key when the terminal is on the first merchandise word or on the nonmerchandise entry word resultsin the subtotal amount being displayed and printed. Pressing the SUBTOTAL key at any other time causes the subtotal amount to be displayed only

Bit 2, when set (1), causes the terminal to print only one footer line on the slip. If bit 2 is reset (0), two footers are printed on the slip. All other media have only one footer line regardless of the state of bit 2.

Bit 3, when set (1), prevents the terminal from printing data on any media. This bit takes precedence over all other print selection bits. This option is used primarily for batch reading of color coded tags. One exception is in the programming mode where read-write to core data is printed on the receipt.

Bit 4, when set (1), causes the terminal to print only on the journal. This bit takes precedence over all other print selection bits except bit 3 of this word. In the programming word, the read-write information is printed on the receipt.

Bit 5, when set (1), causes the terminal to print in all three print stations providing that the following conditions are met.

1. A slip is inserted.
2. The transaction is one that is not programmed as a validated transaction.

NOTE: With bit 5 set (1), the slip does not override the receipt and both are printed on nonvalidate transactions.

Validation Control Bits (6, 7, and 8) – These bits are used to control the printing during transactions programmed for validation.

Bit 6, when set (1), inhibits slip printing even if a slip is inserted. The only exception to this occurs when the pick-up slip bit (bit 7 of location 000) is set (1) permitting only merchandise items to be printed. If, for a particular transaction, the enforce slip bit and the validate bit are set (1) and bit 6 of location 201 is set (1), a slip is not required for the transaction; but, during this same transaction the header line is deleted in the validation printing.

Bit 7 must be set (1) in order to print on the receipt during a validation type transaction.

Bit 8, when set (1), permits 3 station printing providing that bit 6 is reset (0) and bit 7 is set (1).

WORD 46
OPTION CONTROL #3
(LOCATION 202)

This word is programmed to control various terminal functions.

Bit 8, when set (1), inhibits the item back-out function of the ITEM CORRECT key. The ITEM CORRECT key may still be pressed in anticipation of an abort; however, if pressing it is followed by anything other than the pressing of the TOTAL key, an error results.

Bit 7, when set (1), inhibits the transaction abort function of the terminal. An error results if the operator attempts an abort by pressing the ITEM CORRECT key followed by pressing the TOTAL key.

The state of bit 6 of this word determines which itemizer is used as the main itemizer during the merchandise data entry sequence. If bit 6 is reset (0), the taxable itemizer is the main itemizer and the merchandise items entered are normally taxable. If bit 6 is set (1), the nontaxable itemizer is the main itemizer and merchandise items entered are normally nontaxable. This bit is referred to as the merchandise selective itemization (SI) bit. Pressing the MODIFY TAX key causes the alternate itemizer to be used for the particular merchandise item entry.

The state of bit 5 of this word determines which itemizer is used as the main itemizer during nonmerchandise data entries. This bit is referred to as the nonmerchandise selective itemization (SI) bit. If bit 5 is reset (0), the taxable itemizer is used as the main itemizer for nonmerchandise data. If bit 5 is set (1), the nontaxable itemizer is used as the main itemizer for nonmerchandise data. Pressing the MODIFY TAX key causes the alternate

itemizer to be used for a particular nonmerchandise data entry. Under the following conditions the state of bit 5 has no effect.

- On discounts with both itemizers being discounted. (When using the 761 for data collection, both itemizers must not be programmed to be discounted at the same time.)
- On deposits.
- On miscellaneous data entries.

Bit 4, when set (1), enables the credit authorization feature. This bit must be (0) when using the 761 for data collection.

Bit 3, when set (1), enables the check authorization feature. This bit must be (0) when using the 761 for data collection.

Bit 2, when set (1), inhibits an item abort (truncate) during merchandise data entries. When bit 2 is reset (0), item abort is accomplished by pressing the CLEAR key prior to entering data at a particular merchandise word.

Bit 1, when set (1), inhibits an item abort (truncate) during nonmerchandise data entries. When bit 1 is reset (0), item abort is accomplished by pressing the CLEAR key prior to entering data at a particular nonmerchandise word.

WORD 47
STORE NUMBER (LOCATIONS 203-204)

This word contains a store number of up to four digits. Location 203 contains the two most significant digits and location 204 contains the two least significant digits of the store number configured in BCD. The bit configuration for a store number of 123 is shown below.

Location	Bit Configuration							
	b8	b7	b6	b5	b4	b3	b2	b1
203	0	0	0	0	0	0	0	1
204	0	0	1	0	0	0	1	1

WORD 48
TERMINAL NUMBER
(LOCATIONS 205-206)

This word contains a terminal number of up to four digits. Location 205 contains the two most significant digits, and location 206 contains the two least significant diigts of the terminal number configured in BCD.

WORD 49
MAXIMUM NUMBER OF SLIP LINES
(LOCATION 207)

This word contains the binary code for the maximum number of slip lines available for printing on a single slip. It is used by the terminal for formatting the slip and determining when the slip if full. The number programmed in this word corresponds to the number of merchandise and nonmerchandise item lines desired. This number may be programmed from 0 through 127 in binary using bits 1 through 7 of location 207. Bit 8 of this word is a "don't care" bit.

WORD 50
NOT USED (LOCATIONS 210-211)

This word is not presently in use.

WORD 51
CORE CHECK DIGIT
(LOCATION 212)

This word contains a check digit which is generated by the terminal using all data stored in locations 000 through 211 of the read/write memory.

A new core check digit is calculated each time the programming sequence is exited. This check digit is used by the terminal during power up to determine if the contents of locations 000 through 211 have been changed since the last time the check digit was calculated. If the check digit does not compare, the terminal indicates an error during the power up sequence.

This word is also used to check that the read/write memory is reprogrammed correctly. This is done by loading a precalculated (from another 280 with an identical program) check digit into location 212. Correct content of the read/write memory is determined by powering down the terminal after loading the check digit, instead of exiting programming normally by pressing the TOTAL key. An error should not be indicated after powering the terminal back up if the reprogramming has been performed correctly.

WORD 52
OFFLINE REASON CODE (LOCATION 213)

reason from 761.

This word is only used when data collecting with a 761 to store the offline reason code in BCD configuration.

WORD 53
NOT USED (LOCATION 214)

This word is not presently in use.

WORD 54
SLIP LINE COUNT (LOCATION 215)

This word is used to store the current number of lines printed on a slip. The count is stored in BCD form.

WORD 55
ACCOUNT NUMBER STORAGE, WORK REGISTER #3, AND CCTR QUANTITY
(LOCATIONS 216-233)

Locations 216 through 233 are shared locations and used for different functions at different times.

Account Number Storage – All 14 locations are used to store the account number for validation.

Work Register #3 – This register is a five character work area (locations 223-227) used in updating sales and return totals.

CCTR Quantity – Two locations, 232 and 233, are used for storage of quantity before reading a color coded tag.

WORD 56
STORE IND1 (LOCATION 234)

The content of the IND1 register is stored in this location so that the IND1 register can be used for other purposes for more efficient terminal operation.

WORD 57
RELINK (LOCATION 235)

This word contains the address of the next sequential word in the operating flow of the terminal. It indicates to the TCU the next read/write memory location to be accessed upon return from a firmware routine.

WORD 58
QUALIFICATION CODE (LOCATION 236)

The qualification code entered for a transaction is stored in this location and is used by the TCU in controlling operations.

WORD 59
PRINT CONTROL CHARACTER (LOCATION 237)

This location is used for temporary storage of the print control character for the transaction control word presently in process.

WORD 60
CORE FLAG 2 (LOCATION 240)

The various bits of this character are used as flags for controlling TCU operations.

WORD 61
CORE FLAG 3 (LOCATION 241)

The various bits of this character are used as flags for controlling TCU operations.

WORD 62
WORK REGISTER #1
(LOCATIONS 242-245)

The four character locations of this word are used by the TCU in accumulating and storing totals.

WORD 63
WORK REGISTER #2
(LOCATIONS 246-251)

The four characters locations of this word are used by the TCU in accumulating and storing totals.

WORD 64
DEPOSIT TOTAL (LOCATIONS 252-255)

This word is used for the storage of the transaction deposit amount.

WORD 65
NONTAXABLE ITEMIZER
(LOCATIONS 256-261)

The accumulated total for nontaxable item amounts of a transaction is stored in this word.

WORD 66
TAXABLE ITEMIZER
(LOCATIONS 262-265)

The accumulated total for taxable item amounts of a transaction is stored in this word.

WORD 67
NOT USED (LOCATIONS 266-311)

This word is not presently in use.

WORD 68
CASHIER ID NUMBER
(LOCATIONS 312-314)

The cashier identification number is stored in this word. The information is used by the terminal in communications and in the printout of transactions.

WORD 69
DATE (LOCATIONS 315-320)

This word contains the date entered during an opening sequence. The terminal uses this information to print the data on each slip, receipt, and the journal at the end of the transaction. Eight digits maximum can be stored (including two slashes).

WORD 70
CORE FLAG 1
(LOCATION 321)

The various bits of this character are used as flags for controlling TCU operations.

WORD 71
OFFLINE CODE (LOCATION 322)

This word is used to store the reason code for the terminal being offline when data collecting with a 723. The code is printed in the journal when operating in an offline condition. When data collecting with a 761, this word is used for core flags for cassette operation.

WORD 72
TRANSACTION COUNT
(LOCATIONS 323-324)

This word contains the transaction count number of up to four digits. The transaction number is incremented by one at the beginning of each transaction and recycled through zero after the number 9999 is reached.

WORD 73
MEDIA COUNT (LOCATIONS 325-326)

This word contains the media count number of up to four digits. The media number is incremented by one during each transaction for which it is programmed. The media number recycles through zero after 9999 is reached.

WORD 74
NOT USED (LOCATIONS 327-357)

This word is not presently in use.

WORD 75
CASH TOTAL (LOCATIONS 360-364)

This word contains the total amount of cash transacted in favor of the store. The total may be decreased by the amount of cash paid out if the terminal address character on the TCU is programmed for that provision. The cash total may contain up to ten digits.

WORD 76
RETURN TOTAL (LOCATIONS 365-371)

This word contains the total of all return amounts (credits) since the last closing in which a reset was performed. The returns total may contain up to ten digits.

WORD 77
SALES TOTAL (LOCATIONS 372-376)

This word contains the total amount of sales transacted on the terminal. This total may be reset only if the terminal address character on the TCU is programmed for that provision. The sales total may contain up to ten digits.

WORD 78
TOTAL CONTROL (LOCATION 377)

The bits of this word are used as indicators in the event of power failure. After a power failure the TCU uses these bit indications to determine where to start processing information (if a sequence was interrupted). In the programming mode, this word is used to store the sector number which is used to maintain programming and diagnostics limits.

SECTOR "1" WORD DESCRIPTIONS

WORD 79
MNEMONICS (LOCATIONS 000-135, SECTOR 1)

This word is used to store the character codes for the mnemonics to be printed at the three print stations. The characters are stored in ASCII configuration. There are 30 sets of programmable mnemonics, each set consisting of from two to five characters. Any character on the printer typewheel may be programmed. The last character of each mnemonic set must have bit 8 set (1) to indicate the end of that mnemonic set. At least one character for each mnemonic set must be present. The maximum characters per set is limited only by the available core space. The order of the mnemonics cannot be changed. The mnemonics used for abort and diagnostics are printed five times across the media and therefore should not exceed six digits.

WORD 80
CASSETTE LABEL (LOCATIONS 136-217, SECTOR 1)

This word is used for both cassette label and mnemonic expansion. The cassette label characters start at location 217 and go back towards location 136 while the mnemonics expansion characters start at location 136 and go forward toward location 217. The locations used for each purpose is at the option of the customer.

WORD 81
NOT USED (LOCATIONS 220-231, SECTOR 1)

This word is not presently in use.

WORD 82
CORE CHECK DIGIT (LOCATIONS 232, SECTOR 1)

This word contains a check digit which is generated by the terminal using all data stored in locations 000 through 231 of the read/write memory.

A new core check digit is calculated each time the programming sequence is exited. This check digit is used by the terminal during power up to determine if the contents of locations 000 through 231 have been changed since the last time the check digit was calculated. If the check digit does not compare, the terminal indicates an error during the power up sequence.

This word is also used to check that the read/write memory is reprogrammed correctly. This is done by loading a precalculated (from another 280 with an identical program) check digit into location 232. Correct content of the read/write memory is determined by powering down the terminal after loading the check digit, instead of exiting programming normally by pressing the TOTAL key. An error should not be indicated after powering the terminal back up if the reprogramming has been performed correctly.

WORD 83
DC BUFFER (LOCATIONS 233-376, SECTOR 1)

This word is used to store data before transmission to the data collector. Use of the locations in this word is dependent upon the type of data collector used.

When using the 723, locations 251 through 344 are used for the data collector buffer. Location 376 is used to store the odd character.

When using the 761, locations 233 through 376 are used for the data collector buffer.

WORD 84
SECTOR CONTROL (LOCATION 377, SECTOR 1)

This word is used by the firmware to store the sector number in the programming mode. This word is required to maintain programming and diagnostics limits.

CORE MAPS

Tables D-5 and D-6 contain core maps of sectors "0" and "1" respectively. The core maps show the word number, name, location, and sample data. The sample data shown in the core maps is typical data and will vary for particular program applications. The core maps may be used as an orienting device to associate words with their typical content.

Table D-5 Core map, sector "0"

WORD NO.	WORD NAME	LOC. OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
1	Option Control #4	0 0 0	0 0 0 0 1 1 0 1	0 1 5
2	Communications Time Out	0 0 1	0 0 1 1 1 1 0 0	0 7 4
3	CDV Method, Qualification Data Enforce, Tax Exception Code	0 0 2	0 0 0 1 1 0 1 0	0 3 2
4	ID Number TCW and Minimum Floor Limit TCW	0 0 3 0 0 4 0 0 5	0 1 0 0 0 1 0 1 0 0 0 1 0 1 0 1 0 1 1 1 0 1 1 0	1 0 5 0 2 5 1 6 6
5	1st Merchandise TCW	0 0 6 0 0 7 0 1 0	0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 1	1 0 1 0 0 0 0 2 3
6	2nd Merchandise TCW	0 1 1 0 1 2 0 1 3	0 1 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 1 0	1 0 2 0 0 4 0 2 2
7	3rd Merchandise TCW	0 1 4 0 1 5 0 1 6	0 1 0 0 0 0 1 1 0 0 0 0 0 1 1 1 0 0 0 1 1 0 0 0	1 0 3 0 0 7 0 3 0
8	Miscellaneous Data TCW	0 1 7 0 2 0 0 2 1	1 0 1 1 0 1 0 1 1 1 1 1 1 1 1 1 0 0 0 0 1 1 0 1	2 6 5 3 7 7 0 1 5
9	Quantity/Price TCW	0 2 2 0 2 3 0 2 4	0 0 1 0 0 0 1 1 1 1 0 0 1 1 0 1 0 0 1 0 1 0 1 1	0 4 3 3 1 5 0 5 3
10	Nonmerchandise TCW	0 2 5 0 2 6 0 2 7 0 3 0 0 3 1 0 3 2 0 3 3	0 0 1 1 1 0 0 1 0 0 1 1 1 0 1 0 0 0 1 1 1 0 1 1 0 0 1 1 1 1 0 0 0 0 1 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1	0 7 1 0 7 2 0 7 3 0 7 4 0 6 5 0 0 0 0 6 1
11	Discount ID TCW	0 3 4 0 3 5 0 3 6 0 3 7	0 0 1 1 1 0 0 1 0 1 0 0 0 1 0 1 0 0 0 0 0 0 1 1 0 0 1 1 0 1 1 0	0 7 1 1 0 5 0 0 3 0 6 6
12	Discount Percent TCW	0 4 0 0 4 1 0 4 2 0 4 3	0 0 1 1 1 0 0 1 0 1 1 0 0 0 1 1 1 0 0 0 1 1 0 1 0 0 0 1 0 1 0 0	0 7 1 1 4 3 2 1 5 0 2 4
13	Fee Type TCW	0 4 4 0 4 5 0 4 6	0 0 1 1 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 1 0	0 6 2 0 0 2 0 0 6
14	Fee Amount TCW	0 4 7 0 5 0 0 5 1 0 5 2	0 0 1 1 1 0 1 0 0 1 1 0 0 1 0 1 1 1 1 1 1 1 1 1 0 0 1 1 0 1 0 1	0 7 2 1 4 5 3 7 7 0 6 5
15	Miscellaneous Credit Type TCW	0 5 3 0 5 4 0 5 5	0 0 1 1 0 0 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 1 1 0	0 6 3 0 0 2 0 0 6

Table D-5 Core map, sector "0", cont'd

WORD NO.	WORD NAME	LOC. OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
16	Miscellaneous Credit Amount TCW	0 5 6	0 0 1 1 1 0 1 1	0 7 3
		0 5 7	0 1 1 0 0 1 0 1	1 4 5
		0 6 0	1 0 0 0 1 1 0 1	2 1 5
		0 6 1	0 0 1 1 0 1 0 1	0 6 5
17	Deposit Amount TCW	0 6 2	0 0 1 1 1 1 0 0	0 7 4
		0 6 3	0 1 1 0 0 1 0 1	1 4 5
		0 6 4	0 0 0 1 1 0 1 1	0 3 3
		0 6 5	0 0 1 1 0 1 0 1	0 6 5
18	Amount Tendered TCW	0 6 6	0 0 1 0 0 1 0 0	0 4 4
		0 6 7	0 0 0 0 0 0 1 1	0 0 3
		0 7 0	0 0 0 0 1 0 0 0	0 1 0
19	Account Number TCW	0 7 1	0 1 1 0 0 1 0 0	1 4 4
		0 7 2	0 0 1 0 0 0 1 1	0 4 3
		0 7 3	0 0 1 1 1 1 1 0	0 7 6
20	Manual Tax TCW	0 7 4	0 0 1 0 0 0 0 1	0 4 1
		0 7 5	0 0 0 0 0 0 0 0	0 0 0
		0 7 6	1 0 0 0 0 1 0 0	2 0 4
21	Date TCW	0 7 7	0 0 1 0 0 1 0 1	0 4 5
		1 0 0	0 1 1 0 1 1 1 0	1 5 6
		1 0 1	0 0 0 0 1 0 0 0	0 1 0
22	Transaction Void TCW	1 0 2	0 0 1 0 0 0 1 0	0 4 2
		1 0 3	1 1 0 0 1 1 1 1	3 1 7
		1 0 4	0 0 1 0 1 0 0 1	0 5 1
23	Closing TCW	1 0 5	0 0 1 0 0 0 1 1	0 4 3
		1 0 6	0 0 0 0 1 1 1 0	0 1 6
		1 0 7	0 0 0 0 1 0 0 1	0 1 1
24	Header Print Control Table	1 1 0	0 0 0 1 0 0 0 0	0 2 0
		1 1 1	0 0 1 0 1 0 1 1	0 5 3
		1 1 2	0 0 1 1 0 1 1 0	0 6 6
		1 1 3	1 1 0 0 0 1 1 1	3 0 7
25	Footer Print Control Table	1 1 4	0 1 0 1 0 0 0 0	1 2 0
		1 1 5	1 1 1 0 1 0 1 0	3 5 2
		1 1 6	0 0 0 0 0 0 0 0	0 0 0
26	Amount Print Control	1 1 7	1 0 1 1 1 0 0 0	2 7 0
27	Trailer Print Slew Lines	1 2 0	0 1 0 0 0 1 0 0	1 0 4
28	Qualification Choice Table	1 2 1	1 0 0 0 0 0 0 0	2 0 0
		1 2 2	0 0 0 0 0 1 1 1	0 0 7
		1 2 3	0 0 0 0 1 1 0 0	0 1 4
		1 2 4	0 0 0 0 1 1 0 0	0 1 4
		1 2 5	1 1 0 0 0 0 1 0	3 0 2
29	Slip Enforce Table	1 2 6	0 0 1 1 1 1 1 1	0 7 7
		1 2 7	1 1 0 1 1 0 0 0	3 3 0
		1 3 0	1 1 1 1 0 0 1 1	3 6 3
		1 3 1	1 1 1 1 0 0 1 1	3 6 3
30	Media Validation Table	1 3 2	0 0 0 0 0 0 0 0	0 0 0
		1 3 3	0 0 0 0 0 0 0 0	0 0 0
		1 3 4	0 0 0 0 0 0 0 0	0 0 0
		1 3 5	0 0 0 0 0 0 0 0	0 0 0

Table D-5 Core map, sector "0", cont'd

WORD NO.	WORD NAME	LOC. OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
31	Media Count Table	1 3 6	0 0 1 1 1 1 1 1	0 7 7
		1 3 7	1 1 0 1 1 0 0 0	3 3 0
		1 4 0	1 1 1 1 0 0 1 1	3 6 3
		1 4 1	1 1 1 1 0 0 1 1	3 6 3
32	Header/Body/Account Number Spacing	1 4 2	0 1 0 0 0 0 0 0	1 0 0
33	CDV Modulus	1 4 3	1 0 1 0 1 0 1 0	2 5 2
34	CDV Weights	1 4 4	0 0 0 1 0 0 0 1	0 2 1
		1 4 5	0 0 0 1 0 0 0 1	0 2 1
		1 4 6	0 0 1 0 0 0 1 0	0 4 2
		1 4 7	0 0 0 1 0 0 0 1	0 2 1
		1 5 0	0 0 1 0 0 0 1 0	0 4 2
		1 5 1	0 0 0 1 0 0 0 1	0 2 1
		1 5 2	0 0 1 0 0 0 1 0	0 4 2
		1 5 3	0 0 0 1 0 0 0 1	0 2 1
		1 5 4	0 0 1 0 0 0 1 0	0 4 2
		1 5 5	0 0 0 1 0 0 0 1	0 2 1
		1 5 6	0 0 1 0 0 0 1 0	0 4 2
		1 5 7	0 0 0 1 0 0 0 1	0 2 1
		1 6 0	0 0 1 0 0 0 1 0	0 4 2
		1 6 1	0 0 0 1 0 0 0 1	0 2 1
35	Automatic Department Number	1 6 2	0 0 0 0 1 0 0 1	0 1 1
		1 6 3	1 0 0 1 1 0 0 1	2 3 1
36	Automatic Qualification	1 6 4	0 0 0 0 0 0 0 1	0 0 1
37	Rounding Constants	1 6 5	0 0 0 0 0 0 0 0	0 0 0
		1 6 6	0 1 0 1 0 0 0 0	1 2 0
38	Automatic Discount Percent	1 6 7	0 0 0 1 0 0 0 0	0 2 0
		1 7 0	0 0 0 0 0 0 0 0	0 0 0
39	Automatic Tax Percent	1 7 1	0 0 0 1 0 0 1 0	0 2 2
		1 7 2	0 0 0 0 0 0 0 0	0 0 0
40	RST, Offline Code Control, and Audio Offline Indication	1 7 3	0 0 0 0 0 0 0 0	0 0 0
41	Data Collector Buffer Cutoff	1 7 4	1 1 0 0 0 1 1 1	3 0 7
42	Sequence Format Character	1 7 5	0 0 0 0 0 0 0 0	0 0 0
43	Floor Limit	1 7 6	0 0 0 0 0 0 0 0	0 0 1
		1 7 7	0 1 0 0 1 0 0 1	1 1 1
44	Option Control 1	2 0 0	0 1 0 1 0 1 0 0	1 2 4
45	Option Control 2	2 0 1	0 0 0 0 0 0 0 0	0 0 0
46	Option Control 3	2 0 2	0 0 0 0 0 0 0 0	0 0 0
47	Store Number	2 0 3	0 0 0 0 0 0 1 1	0 0 3
		2 0 4	0 0 1 1 0 0 1 1	0 6 3
48	Terminal Number	2 0 5	0 0 0 0 0 0 1 0	0 0 2
		2 0 6	1 0 0 0 0 0 0 0	2 0 0
49	Maximum Slip Lines	2 0 7	0 0 0 0 1 0 1 0	0 1 2

-10% (025-152)

126 = NO Tax%

Table D-5 Core map, sector "0", cont'd

WORD NO.	WORD NAME	LOC. OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
50	Not Used	210 211	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0
51	Core Check Digit	212	1 1 0 0 0 1 0 0	3 0 4
52	Offline Reason Code (761)	213	0 0 0 0 0 0 0 0	0 0 0
53	Not Used	214	0 0 0 0 0 0 0 0	0 0 0
54	Slip Line Count	215		
55	Account Number Storage (216-233), Work Register #3 (223-227), and CCTR Quantity (232-233)	216 217 220 221 222 223 224 225 226 227 230 231 232 233		
56	Store IND 1	234		
57	Re-Link	235		
58	Qualification Code	236		
59	Print Control Character	237		
60	Core Flag 2	240		
61	Core Flag 3	241		
62	Work Register #1	242 243 244 245		
63	Work Register #2	246 247 250 251		
64	Deposit Total	252 253 254 255		
65	Nontaxable Itemizer	256 257 260 261		
66	Taxable Itemizer	262 263 264 265		

Table D-5 Core map, sector "0", cont'd

WORD NO.	WORD NAME	LOC, OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
67	Not Used	2 6 6 2 6 7 2 7 0 2 7 1 2 7 2 2 7 3 2 7 4 2 7 5 2 7 6 2 7 7 3 0 0 3 0 1 3 0 2 3 0 3 3 0 4 3 0 5 3 0 6 3 0 7 3 1 0 3 1 1		
68	Operator ID Number	3 1 2 3 1 3 3 1 4		
69	Current Date	3 1 5 3 1 6 3 1 7 3 2 0		
70	Core Flag #1	3 2 1		
71	Offline Reason Code (723)	3 2 2		
72	Transaction Count	3 2 3 3 2 4		
73	Media Count	3 2 5 3 2 6		
74	Not Used	3 2 7 3 3 0 3 3 1 3 3 2 3 3 3 3 3 4 3 3 5 3 3 6 3 3 7 3 4 0 3 4 1 3 4 2 3 4 3 3 4 4 3 4 5 3 4 6 3 4 7 3 5 0 3 5 1 3 5 2 3 5 3 3 5 4 3 5 5 3 5 6 3 5 7		

Table D-5 Core map, sector "0", cont'd

WORD NO.	WORD NAME	LOC. OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
75	Cash Total	360 361 362 363 364		
76	Returns Total	365 366 367 370 371		
77	Sales Total	372 373 374 375 376		
78	Total Control	377		

Table D-6 Core map, sector "1"

WORD NO.	WORD NAME *		LOC. OCTAL	SAMPLE DATA BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
79	Mnemonics		M 0 0 0	0 1 0 0 1 1 0 1	1 1 5
		0 1	D 0 0 1	0 1 0 0 0 1 0 0	1 0 4
			S 0 0 2	1 1 0 1 0 0 1 1	3 2 3
			R 0 0 3	0 1 0 1 0 0 1 0	1 2 2
		0 2	T 0 0 4	0 1 0 1 0 1 0 0	1 2 4
			N 0 0 5	1 1 0 0 1 1 1 0	3 1 6
			E 0 0 6	0 1 0 0 0 1 0 1	1 0 5
		0 3	R 0 0 7	0 1 0 1 0 0 1 0	1 2 2
			R 0 1 0	1 1 0 1 0 0 1 0	3 2 2
			S 0 1 1	0 1 0 1 0 0 1 1	1 2 3
		0 4	T 0 1 2	0 1 0 1 0 1 0 0	1 2 4
			L 0 1 3	1 1 0 0 1 1 0 0	3 1 4
			D 0 1 4	0 1 0 0 0 1 0 0	1 0 4
		0 5	I 0 1 5	0 1 0 0 1 0 0 1	1 1 1
			S 0 1 6	1 1 0 1 0 0 1 1	3 2 3
			F 0 1 7	0 1 0 0 0 1 1 0	1 0 6
		0 6	E 0 2 0	0 1 0 0 0 1 0 1	1 0 5
			E 0 2 1	1 1 0 0 0 1 0 1	3 0 5
			M 0 2 2	0 1 0 0 1 1 0 1	1 1 5
		0 7	S 0 2 3	0 1 0 1 0 0 1 1	1 2 3
			C 0 2 4	1 1 0 0 0 0 1 1	3 0 3
			D 0 2 5	0 1 0 0 0 1 0 0	1 0 4
		0 8	E 0 2 6	0 1 0 0 0 1 0 1	1 0 5
			P 0 2 7	1 1 0 1 0 0 0 0	3 2 0
			T 0 3 0	0 1 0 1 0 1 0 0	1 2 4
		0 9	A 0 3 1	0 1 0 0 0 0 0 1	1 0 1
			X 0 3 2	1 1 0 1 1 0 0 0	3 3 0
			T 0 3 3	0 1 0 1 0 1 0 0	1 2 4
		1 0	T 0 3 4	0 1 0 1 0 1 0 0	1 2 4
			L 0 3 5	1 1 0 0 1 1 0 0	3 1 4
			C 0 3 6	0 1 0 0 0 0 1 1	1 0 3
		1 1	R 0 3 7	0 1 0 1 0 0 1 0	1 2 2
			T 0 4 0	1 1 0 1 0 1 0 0	3 2 4
			A 0 4 1	0 1 0 0 0 0 0 1	1 0 1
		1 2	T 0 4 2	0 1 0 1 0 1 0 0	1 2 4
			D 0 4 3	1 1 0 0 0 1 0 0	3 0 4
			C 0 4 4	0 1 0 0 0 0 1 1	1 0 3
		1 3	D 0 4 5	0 1 0 0 0 1 0 0	1 0 4
			U 0 4 6	1 1 0 1 0 1 0 1	3 2 5
			C 0 4 7	0 1 0 0 0 0 1 1	1 0 3
		1 4	H 0 5 0	0 1 0 0 1 0 0 0	1 1 0
			G 0 5 1	1 1 0 0 0 1 1 1	3 0 7
			C 0 5 2	0 1 0 0 0 0 1 1	1 0 3
		1 5	S 0 5 3	0 1 0 1 0 0 1 1	1 2 3
			H 0 5 4	1 1 0 0 1 0 0 0	3 1 0

* The double digit numbers are the mnemonics sequence numbers.

Table D-6 Core map, sector "1", cont'd

WORD NO.	WORD NAME *		LOC. OCTAL	SAMPLE DATA									
				BINARY BIT 8	7	6	5	4	3	2	1	OCTAL	
79 Cont'd	Mnemonics		C 0 5 5	0	1	0	0	0	0	1	1	1	0 3
		16	O 0 5 6	0	1	0	0	1	1	1	1	1	1 7
			D 0 5 7	1	1	0	0	0	1	0	0	3	0 4
			L 0 6 0	0	1	0	0	1	1	0	0	1	1 4
		17	W 0 6 1	0	1	0	1	0	1	1	1	1	2 7
			Y 0 6 2	1	1	0	1	1	0	0	1	3	3 1
			V 0 6 3	0	1	0	1	0	1	1	0	1	2 6
		18	O 0 6 4	0	1	0	0	1	1	1	1	1	1 7
			D 0 6 5	1	1	0	0	0	1	0	0	3	0 4
			R 0 6 6	0	1	0	1	0	0	1	0	1	2 2
		19	O 0 6 7	0	1	0	0	1	1	1	1	1	1 7
			A 0 7 0	1	1	0	0	0	0	0	1	3	0 1
			C 0 7 1	0	1	0	0	0	0	1	1	1	0 3
		20	S 0 7 2	0	1	0	1	0	0	1	1	1	2 3
			H 0 7 3	1	1	0	0	1	0	0	0	3	1 0
			R 0 7 4	0	1	0	1	0	0	1	0	1	2 2
		21	S 0 7 5	0	1	0	1	0	0	1	1	1	2 3
			T 0 7 6	1	1	0	1	0	1	0	0	3	2 4
			C 0 7 7	0	1	0	0	0	0	1	1	1	0 3
		22	S 1 0 0	0	1	0	1	0	0	1	1	1	2 3
			– 1 0 1	1	0	1	0	1	1	0	1	2	5 5
			R 1 0 2	0	1	0	1	0	0	1	0	1	2 2
		23	T 1 0 3	0	1	0	1	0	1	0	0	1	2 4
			N 1 0 4	1	1	0	0	1	1	1	0	3	1 6
			S 1 0 5	0	1	0	1	0	0	1	1	1	2 3
		24	L 1 0 6	0	1	0	0	1	1	0	0	1	1 4
			E 1 0 7	1	1	0	0	0	1	0	1	3	0 5
			C 1 1 0	0	1	0	0	0	0	1	1	1	0 3
		25	N 1 1 1	0	1	0	0	1	1	1	0	1	1 6
			T 1 1 2	1	1	0	1	0	1	0	0	3	2 4
			V 1 1 3	0	1	0	1	0	1	1	0	1	2 6
			O 1 1 4	0	1	0	0	1	1	1	1	1	1 7
		26	I 1 1 5	0	1	0	0	1	0	0	1	1	1 1
			D 1 1 6	0	1	0	0	0	1	0	0	1	0 4
			1 1 7	1	0	1	0	0	0	0	0	2	4 0
			D 1 2 0	0	1	0	0	0	1	0	0	1	0 4
			I 1 2 1	0	1	0	0	1	0	0	1	1	1 1
		27	A 1 2 2	0	1	0	0	0	0	0	1	1	0 1
			G 1 2 3	0	1	0	0	0	1	1	1	1	0 7
			1 2 4	1	0	1	0	0	0	0	0	2	4 0
			C 1 2 5	0	1	0	0	0	0	1	1	1	0 3
		28	T 1 2 6	0	1	0	1	0	1	0	0	1	2 4
			D 1 2 7	1	1	0	0	0	1	0	0	3	0 4
			/ 1 3 0	0	0	1	0	1	1	1	1	0	5 7
		29	/ 1 3 1	0	0	1	0	1	1	1	1	0	5 7
			/ 1 3 2	1	0	1	0	1	1	1	1	2	5 7
			N 1 3 3	0	1	0	0	1	1	1	0	1	1 6
		30	T 1 3 4	0	1	0	1	0	1	0	0	1	2 4
			1 3 5	1	0	1	0	0	0	0	0	2	4 0

* The double digit numbers are the mnemonics sequence numbers.

Table D-6 Core map, sector "1", cont'd

WORD NO.	WORD NAME	LOC. OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
80	Mnemonics Expansion ↓	136		
		137		
		140		
		141		
		142		
		143		
		144		
		145		
		146		
		147		
		150		
		151		
		152		
		153		
		154		
		155		
		156		
		157		
		160		
		161		
		162		
		163		
		164		
		165		
		166		
		167		
		170		
		171		
		172		
		173		
		174		
		175		
		176		
		177		
		200		
		201		
		202		
		203		
		204		
		205		
		206		
		207		
		210		
		211		
		212		
		213		
		214		
		215		
		216		
	↑ 761 Label	217		
81	Not Used	220		
		221		
		222		
		223		
		224		
		225		
		226		
		227		
		230		
		231		
82	Core Check	232	0 0 1 0 0 1 0 0	044

Table D-6 Core map, sector "1", cont'd

WORD NO.	WORD NAME	LOC. OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
83	761 DC Buffer	2 3 3 2 3 4 2 3 5 2 3 6 2 3 7 2 4 0 2 4 1 2 4 2 2 4 3 2 4 4 2 4 5 2 4 6 2 4 7 2 5 0		
	761 or 723 DC Buffer	2 5 1 2 5 2 2 5 3 2 5 4 2 5 5 2 5 6 2 5 7 2 6 0 2 6 1 2 6 2 2 6 3 2 6 4 2 6 5 2 6 6 2 6 7 2 7 0 2 7 1 2 7 2 2 7 3 2 7 4 2 7 5 2 7 6 2 7 7 3 0 0 3 0 1 3 0 2 3 0 3 3 0 4 3 0 5 3 0 6 3 0 7 3 1 0 3 1 1 3 1 2 3 1 3 3 1 4 3 1 5 3 1 6 3 1 7 3 2 0 3 2 1 3 2 2 3 2 3 3 2 4 3 2 5 3 2 6 3 2 7 3 3 0		

Table D-6 Core map, sector "1", cont'd

WORD NO.	WORD NAME	LOC. OCTAL	SAMPLE DATA	
			BINARY BIT 8 7 6 5 4 3 2 1	OCTAL
83 Cont'd	761 or 723 DC Buffer Cont'd	3 3 1 3 3 2 3 3 3 3 3 4 3 3 5 3 3 6 3 3 7 3 4 0 3 4 1 3 4 2 3 4 3 3 4 4		
	761 DC Buffer	3 4 5 3 4 6 3 4 7 3 5 0 3 5 1 3 5 2 3 5 3 3 5 4 3 5 5 3 5 6 3 5 7 3 6 0 3 6 1 3 6 2 3 6 3 3 6 4 3 6 5 3 6 6 3 6 7 3 7 0 3 7 1 3 7 2 3 7 3 3 7 4 3 7 5		
	761 DC Buffer or 723 Odd Character	3 7 6		
84	Sector Control	3 7 7		

PROGRAMMING METHODS

Programming consists of reading out data stored in the read/write memory and writing new data into it. The read and write operations performed during the programming sequence are controlled by special usage of the function keys. During the program sequence, printing occurs only on the receipt. The core maps contained in tables D-5 and D-6 may be used as a reference for word locations and typical data.

CODING CONVENTIONS

During programming sequences, octal coding is used for all address and data entries or read outs. To enable the programmer to enter correct data it is sometimes necessary for BCD, hexadecimal, or decimal numbers to be converted to octal coding. This may be done either by determining the bit configuration of the data and grouping the bits or by using conversion tables such as those shown in tables D-7 and D-8.

Table D-7 Decimal to octal conversion table

Base 8.

Decimal Tens and Hundreds	Decimal Units 0	1	2	3	4	5	6	7	8	9
0	000	001	002	003	004	005	006	007	010	011
10	012	013	014	015	016	017	020	021	022	023
20	024	025	026	027	030	031	032	033	034	035
30	036	037	040	041	042	043	044	045	046	047
40	050	051	052	053	054	055	056	057	060	061
50	062	063	064	065	066	067	070	071	072	073
60	074	075	076	077	100	101	102	103	104	105
70	106	107	110	111	112	113	114	115	116	117
80	120	121	122	123	124	125	126	127	130	131
90	132	133	134	135	136	137	140	141	142	143
100	144	145	146	147	150	151	152	153	154	155
110	156	157	160	161	162	163	164	165	166	167
120	170	171	172	173	174	175	176	177	200	201
130	202	203	204	205	206	207	210	211	212	213
140	214	215	216	217	220	221	222	223	224	225
150	226	227	230	231	232	233	234	235	236	237
160	240	241	242	243	244	245	246	247	250	251
170	252	253	254	255	256	257	260	261	262	263
180	264	265	266	267	270	271	272	273	274	275
190	276	277	300	301	302	303	304	305	306	307
200	310	311	312	313	313	315	316	317	320	321
210	322	323	324	325	326	327	330	331	332	333
220	334	335	336	337	340	341	342	343	344	345
230	346	347	350	351	352	353	354	355	356	357
240	360	361	362	363	364	365	366	367	370	371
250	372	373	374	375	376	377				

Table D-8 Hexadecimal (HEX) and binary coded decimal (BCD) to octal conversion table

HEX or BCD	BCD 0	1	2	3	4	5	6	7	8	9	HEX A	B	C	D	E	F
00	000	001	002	003	004	005	006	007	010	011	012	013	014	015	016	017
10	020	021	022	023	024	025	026	027	030	031	032	033	034	035	036	037
20	040	041	042	043	044	045	046	047	050	051	052	053	054	055	056	057
30	060	061	062	063	064	065	066	067	070	071	072	073	074	075	076	077
40	100	101	102	103	104	105	106	107	110	111	112	113	114	115	116	117
50	120	121	122	123	124	125	126	127	130	131	132	133	134	135	136	137
60	140	141	142	143	144	145	146	147	150	151	152	153	154	155	156	157
70	160	161	162	163	164	165	166	167	170	171	172	173	174	175	176	177
80	200	201	202	203	204	205	206	207	210	211	212	213	214	215	216	217
90	220	221	222	223	224	225	226	227	230	231	232	233	234	235	236	237
A0	240	241	243	243	244	245	246	247	250	251	252	253	254	255	256	257
B0	260	261	262	263	264	265	266	267	270	271	272	273	274	275	276	277
C0	300	301	302	303	304	305	306	307	310	311	312	313	314	315	316	317
D0	320	321	322	323	324	325	326	327	330	331	332	333	334	335	336	337
E0	340	341	342	343	344	345	346	347	350	351	352	353	354	355	356	357
F0	360	361	362	363	364	365	366	367	370	371	372	373	374	375	376	377

GROUPING

Grouping to attain an octal equivalent is done by first determining the bit configuration of the decimal, hex, or BCD number, then dividing the bits into groups of three starting from the right (least significant bit first).

EXAMPLES

1. To convert decimal number 125 to its octal equivalent, first determine the bit configuration. This is done by converting 125 to binary, which results in the following configuration.

	128	64	32	16	8	4	2	1
Decimal 125 =	0	1	1	1	1	1	0	1

125

Then by grouping the binary configuration into three-bit groups the following octal coding results.

Straight Binary of 125 =	01	111	101
Grouping Result =	1	7	5

Octal coded 175 is the equivalent of decimal 125.

2. To convert the hexadecimal E7 to octal coding, first determine the binary bit configuration. The following is a list of hexadecimal bit configurations.

		Code		Bit Configuration
HEX	BCD	0	=	0000
		1	=	0001
		2	=	0010
		3	=	0011
		4	=	0100
		5	=	0101
		6	=	0110
		7	=	0111
		8	=	1000
		9	=	1001
		A	=	1010
		B	=	1011
		C	=	1100
		D	=	1101
		E	=	1110
		F	=	1111

Hexadecimal E7 has the following bit configuration.

Hex E7 =	1110	0111
Hex	E	7

Grouping this bit configuration to form the octal equivalent is done as follows.

Hex E7 =	11	100	111
Octal Equivalent of Hex E7 =	3	4	7

3. To express the BCD number 89 in octal form use the same method as in example 2, noting that BCD numbers use only the bit positions for 0-9.

BCD 89 = octal 211

CONVERSION TABLES

Conversion tables may be used to simplify gaining an octal equivalent of a particular number. Table D-7 provides decimal to octal conversion, while table D-8 provides hexadecimal and BCD to octal conversion.

ENTERING PROGRAMMING MODE

The terminal may be made available for programming by actuating the programming key in its keylock, then entering a qualification code of 47. If an error occurs during powerup, the terminal enters programming mode automatically upon activation of the programming key. During diagnostic sequences, the programming mode may be entered without using the programming key.

SECTOR CONTROL

When entering into the programming mode, the terminal will automatically go to sector "0". To access sector "1" at any time in the programming mode, enter a 1 and press the ITEM CORRECT key. To go from sector "1" to sector "0", enter a 0 and press the ITEM CORRECT key.

ACCESSIBLE CORE LOCATIONS

In the programming mode, the following core locations are available for read and write operations.

Sector "0" – 000 through 212
Sector "1" – 000 through 232

If the terminal is in the diagnostic programming mode, the following core locations are available for read and write operations.

Sector "0" – 000 through 326
Sector "1" – 000 through 376

READING DATA

There are three methods of reading data from the read/write memory while operating in the programming mode. These methods are address/read, advance/read, and core dump.

ADDRESS/READ

This method is used to read data from an addressed location. By indexing the desired address in octal code and then pressing the ENTER key, the data is read from the location, displayed, and printed in octal code. For example, to read the data contained in location 120 octal, index 120 on the keyboard, then press the ENTER key.

"120 – ENTER"

The address and data are displayed and printed as follows.

120-104 Display
120/104 Printout

ADVANCE/READ

This method is used to advance to the next sequential character location in the read/write memory and read its content. For example, to read the next sequential location

after having read the data in location 120 octal, press the ENTER key.

"ENTER"

The address and the data contained in the next sequential location, in this case 121, is displayed and printed.

121-000 Display
121/000 Printout

The entire accessible section of the read/write memory may be sequentially read using this method.

CORE DUMP

This method of reading is used to automatically read or dump the complete contents of the read/write memory. This dump may be initiated at any location by indexing the starting address then pressing the SUBTOTAL key. For example, to start a core dump at location 000, index 000 and then press SUBTOTAL.

"000 – SUBTOTAL"

The terminal automatically displays and prints the address and data for each location successively. The dump continues until either a key is pressed on the keyboard or the last accessible address is reached. If any key is pressed during the core dump, the terminal stops the sequential reading and printing operation. When the last accessible location is reached, the error tone sounds, and the error light is illuminated, requiring the operator to press the CLEAR key before accessing other less significant locations or exiting from programming mode.

WRITING DATA

There are two methods used to write data into the read/write memory. They are address/write and advance/write.

ADDRESS/WRITE

This method of writing is performed by indexing the address of the desired location, pressing the /FOR key, indexing the data to be written into the location, and pressing the PRICE CHANGE key. For example, to write the data 366 octal into location 037, index 037, press the /FOR key, index 366, then press the PRICE CHANGE key.

"037 – /FOR – 366 – PRICE CHANGE"

The terminal then prints and displays the address and the data.

037-366 Display
037/366 # Printout

The # sign on the printout indicates a write operation.

ADVANCE/WRITE

This method of writing provides the operator with the ability to write data in the next sequential location without entering its address. This operation is performed by the operator entering the data to be written and pressing the PRICE CHANGE key. For example, if the terminal is presently at location 037 and a data input of 071 octal at location 040 is desired, index 071, then press PRICE CHANGE.

"071 – PRICE CHANGE"

The terminal displays and prints the location and data.

040-071 Display
040/071 # Printout

NOTE: Location 040 is the next sequential location after 037 because of the use of octal coded addresses.

EXITING FROM PROGRAMMING MODE

Pressing the TOTAL key causes the terminal to exit the programming mode of operation. The terminal generates a new core check digit for each sector each time programming is exited.

SUMMARY OF FUNCTION KEY USE DURING PROGRAMMING

Use of function keys during programming is summarized in table D-9.

Table D-9 Function key use during programming

FUNCTION KEY	USE
ENTER	1. Read data from an accessed location 2. Read data from next sequential location when no address is entered.
SUBTOTAL	Initiate core dump
PRICE CHANGE	1. Write data into accessed location. 2. Write data into next sequential location when no address is entered.
/FOR	Separate address from data during write operation.
TOTAL	Exit from programming
ANY KEY	Terminate core dump
ITEM CORRECT	Used to access sector "0" or "1"

PROGRAMMING RESTRICTIONS

When changing the content of the read/write memory, the following restrictions must be taken into consideration.

1. All word sizes and locations are constant with the exception of some transaction control words and the mnemonics word.
2. The following transaction control words may be skipped by programming the skip bit set (1). All other words must be present.

a. Two of the three merchandise words

b. Miscellaneous Data

c. Discount ID

d. Fee Type

e. Miscellaneous Credit Type

f. Amount tendered

3. The department number, class number and merchandise number entries may be interchanged in any order using words 5, 6, and 7. Whenever the sequence is changed, the sequence format character, word 42, must also be changed. No other interchanging of words is possible.

PROGRAMMING EXAMPLES

EXAMPLE 1

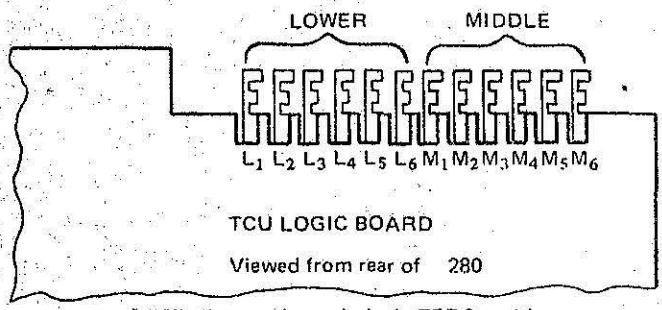
Assume that merchandise words 5, 6, and 7 are programmed for department number, class number, and merchandise number respectively. To skip the second merchandise data entry (CLASS), first refer to the core map (table D-5) and determine the location of the first character of word number 6. Word 6 is contained in locations 011 through 013 of sector "0". Enter programming mode and read out the contents of location 011, which contains the skip bit. If, for example, the data read is 102, convert 102 to the bit configuration (01000010). Make the skip function True by setting the skip bit (bit 8) in the configuration to logic ONE. This results in a bit configuration of 11000010 which converts to 302 octal. Write the data into the read/write memory by indexing 011 (location), pressing the /FOR key, indexing 302 (data), and pressing the PRICE CHANGE key. If no other programming changes are required at this time, exit from programming by pressing the TOTAL key. Check the programming change by performing a merchandise transaction. With this programming change accomplished, the class number entry is not required during the transaction sequence. The MDSE. NO. descriptor is illuminated immediately after entering the department number data. This bypasses illumination of the CLASS descriptor and any data entry requirements associated with the class number.

EXAMPLE 2

Change the automatic discount from 10 percent as shown in the core map to 15.75 percent. First determine the location of the automatic discount percent word by referring to the core map, table D-5. Word 39 is made up of two characters in locations 167 and 170. As explained in the word description for word 39, the discount percent is stored in packed BCD with the least significant digit in bits 1-4 of location 170 and the most significant digit in bits 5-8 of location 167. Enter programming and read out the content of locations 167 and 170. In this example the octal data will be 020 for location 167 and 000 for location 170. The octal 020 converts to 10 in BCD code and is 00010000 bit by bit. To change the discount percent to 15.75 percent, create a packed BCD configuration equal to 15 for location 167. This results in a bit configuration of 00010101 which converts to 025 octal. Create a packed BCD configuration equal to 75 for location 170. This results in 01110101 for the bit configuration which converts to 165 octal. Write the data into the read/write memory by indexing 167 (location), pressing the /FOR key, indexing 025 (data), and pressing the PRICE CHANGE key. Then enter 165 (data) and press PRICE CHANGE key. Since location 170 is the next sequential address after 167, it is not necessary to enter the address when inputing data into location 170. Exit from programming by pressing the TOTAL key. Check the programming by performing a transaction which uses the discount percent.

TERMINAL ADDRESS CHARACTER PROGRAMMING

Terminal address character programming is performed in addition to read/write memory programming. This programming involves positioning "C" clips in specific directions on the upper edge of the TCU logic board. Terminal address character programming is performed by a Technical Service Representative since the cabinet must be removed to access the TCU. Two 6-bit terminal address characters are located on the upper edge of the TCU logic board. These characters are programmed by inserting "C" clips in slots on the TCU logic board. Figure D-9 shows the position of the terminal address characters with "C" clips installed for logic ZERO inputs to all bit positions (the TCU is shown as viewed from the rear of the 280). A "C" clip inserted facing left indicates a logic ONE, and if inserted facing right, indicates a logic ZERO for the particular bit position.



* "C" clips are shown in logic ZERO position.

Figure D-9 Terminal address characters

The lower terminal address character contains six bit positions (L1 through L6) and is programmed to provide the following functions.

L1 (bit 1) — This bit position is used for the inflated currency feature. When the "C" clip is programmed for logic ONE (left), the inflated currency feature is in effect. This bit must be programmed for logic ZERO (right), for the 1/2 Penny model.

L2 (bit 2) — This bit position is used to determine if the 280 is to have a printing cash total. When the "C" clip is programmed for logic ZERO (right), the cash total is printed during a closing (44) transaction. If the "C" clip is positioned to the left (logic ONE), a cash total is not printed.

L3 (bit 3) — This bit is not used for the basic model but must be programmed for logic ZERO (right) for the 1/2 Penny model.

L4 (bit 4) – The state of this bit position controls resetting of the sales total. If the "C" clip is positioned to the right (logic ZERO), the sales total is reset during a closing (44) transaction. If the "C" clip is positioned to the left (Logic ONE), the sales total is programmed not resettable.

L5 (bit 5) – The state of this bit position controls decrementing the cash total. If the "C" clip is positioned to the right (logic ZERO), the cash total is decremented by the amount of cash paid out during each transaction. If the "C" clip is positioned to the left (logic ONE), the cash total is never decremented.

NOTE: If the terminal is used to apply payments on account (cash deposits larger than the sale items during charge transactions), L5 must be programmed as logic ZERO.

L6 (bit 6) – Not used.

The middle terminal address character contains six bit positions (M1 through M6) and is programmed to provide the following functions.

M1 (bit 1) through M6 (bit 6) – These bits must be programmed logic ZERO (right) for the basic and 1/2 Penny models. These bits are used to indicate to the firmware the presence of additional ROM arrays such as those containing distribution totals or SLC features on subsequent 280 models.

NOTE: A "C" clip must be installed in each slot of the terminal address characters to prevent floating inputs to the MOS/LSI arrays on the TCU logic board.

SECTION E
DATA COLLECTION

INTRODUCTION

One of the principal features of the 280 International retail terminal is its ability to transmit transaction data to a data collector for recording on magnetic tape. The data collector may be a 723 Data Collector or a 761 Cassette Terminal Recorder.

When using the 723, transmission of data is accomplished using a four-wire, full-duplex system. A terminal communications adapter (TCA) and modem are required for 723 data collection. The characters are transmitted in ASCII format. Check and credit authorization are available when using the 723.

The 761 is connected to the TCU common port and therefore does not require the TCA and modem. Transmission to the 761 is in accordance with common port communication specifications and is also in ASCII format. Check and credit authorization are not available when using the 761.

The message format and merchandise and nonmerchandise codes used in transmission for data collection are the same for both the 723 and 761 models.

DATA MESSAGE FORMAT

The 280 transfers variable length data messages to the data collector. Each data field within the data message is separated by a data separator character (FS, RS, GS, or US). A data message is transferred serially by bit and serially by character with the least significant bit of the most significant character in a data field being transferred first.

Figures E-1 through E-7 illustrate the message formats of various operations. The following items apply when referring to these figures.

1. The numeric shown below each data field indicates the maximum permissible number of characters in that field. The maximum number of digits for data fields that are printed is restricted by the size of the print buffer and the slip format. This maximum number also depends on the number of data fields being printed on the same print line.

2. Transmission of a data message occurs following an FS (file separator), but may also occur following an RS (record separator) or GS (group separator). An FS character is inserted at the end of the data message if segments are transmitted at nonmandatory transmission points (when data collector buffer full condition exists).

3. When a transaction is aborted, the data message transferred ends with two record separators (RS) followed by a file separator (FS).

4. A record separator (RS) is inserted during a merchandise item entry if the item is bypassed (truncated) as a result of pressing the CLEAR key.

5. A format code is transferred along with each merchandise item data segment. The code is derived from the sequence format word in the read/write memory during manual entries. This code is customer programmable to indicate a particular sequence of manually entered merchandise data to the central processing facility. During tag read operations the format code encoded on the tag is used for this purpose.

6. A merchandise item code is transferred along with each merchandise item data segment. The code designates the type of the item along with any qualifiers. The merchandise item codes are listed in table E-1.

Table E-1 Merchandise item codes

MERCHANDISE ITEM CODE	TYPE/QUALIFIER
0	Sale item/taxable
1	Sale item/nontaxable
2	Sale item/price change
3	Sale item/nontaxable/price change
4	Exchange item/taxable
5	Exchange item/nontaxable
6	Exchange item/price change
7	Exchange item/nontaxable/price change
8	Item Correct/taxable
9	Item Correct/nontaxable

7. A nonmerchandise identification code and modifier code is transferred along with nonmerchandise segments. The nonmerchandise identification code identifies the type of entry and the modifier code indicates whether the entry is taxable, nontaxable, or an item correct. These codes are listed in table E-2.

Table E-2 Nonmerchandise identification and modifier codes

Nonmerchandise Identification Code	Nonmerchandise Type	Modifier Code
1	Discount on taxable itemizer	0
1	Discount on nontaxable itemizer	1
2	Fee taxable itemizer	0
2	Fee nontaxable itemizer	1
2	Fee taxable back out	2
2	Fee nontaxable itemizer back out	3
3	Miscellaneous credit taxable itemizer	0
3	Miscellaneous credit nontaxable itemizer	1
3	Miscellaneous credit taxable itemizer back out	2
3	Miscellaneous credit nontaxable itemizer back out	3
4	Cash deposit	1
5	Cash deposit	1
6	Miscellaneous data	0
6	Miscellaneous data back out	2
9	Tax	—

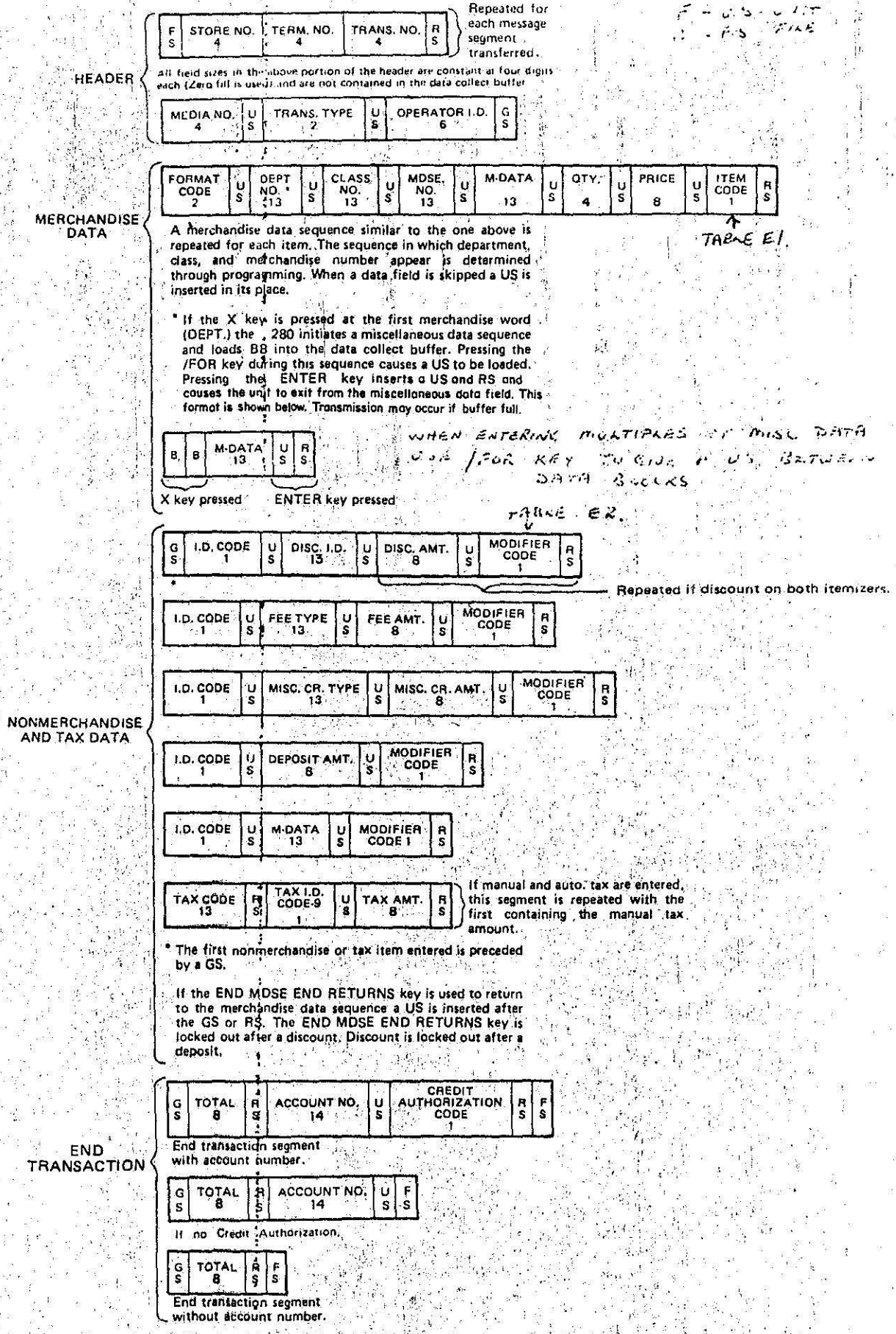

HEADER
FS | STORE NO. 4 | TERM. NO. 4 | TRANS. NO. 4 | RS
Repeated for each message segment transferred.
all field sizes in the above portion of the header are constant at four digits each (Zero fill is used) and are not contained in the data collect buffer
MEDIA NO. 4 | US | TRANS. TYPE 2 | US | OPERATOR I.D. 6 | GS
MERCHANDISE DATA
FORMAT CODE 2 | US | DEPT NO. * 13 | US | CLASS NO. 13 | US | MDSE. NO. 13 | US | M-DATA 13 | US | QTY. 4 | US | PRICE 8 | US | ITEM CODE 1 | RS
TABLE E1
A merchandise data sequence similar to the one above is repeated for each item. The sequence in which department, class, and merchandise number appear is determined through programming. When a data field is skipped a US is inserted in its place.
* If the X key is pressed at the first merchandise word (DEPT.) the 280 initiates a miscellaneous data sequence and loads BB into the data collect buffer. Pressing the /FOR key during this sequence causes a US to be loaded. Pressing the ENTER key inserts a US and RS and causes the unit to exit from the miscellaneous data field. This format is shown below. Transmission may occur if buffer full.
B | B | M-DATA 13 | US | RS
X key pressed
ENTER key pressed
WHEN ENTERING MULTIPLES OF MISC DATA USE /FOR KEY TO GIVE A US BETWEEN DATA BLOCKS
TABLE E2.
NONMERCHANDISE AND TAX DATA
GS | I.D. CODE 1 | US | DISC. I.D. 13 | US | DISC. AMT. 8 | US | MODIFIER CODE 1 | RS
Repeated if discount on both itemizers.
I.D. CODE 1 | US | FEE TYPE 13 | US | FEE AMT. 8 | US | MODIFIER CODE 1 | RS
I.D. CODE 1 | US | MISC. CR. TYPE 13 | US | MISC. CR. AMT. 8 | US | MODIFIER CODE 1 | RS
I.D. CODE 1 | US | DEPOSIT AMT. 8 | US | MODIFIER CODE 1 | RS
I.D. CODE 1 | US | M-DATA 13 | US | MODIFIER CODE 1 | RS
TAX CODE 13 | RS | TAX I.D. CODE-9 1 | US | TAX AMT. 8 | RS
If manual and auto. tax are entered, this segment is repeated with the first containing the manual tax amount.
* The first nonmerchandise or tax item entered is preceded by a GS.
If the END MDSE END RETURNS key is used to return to the merchandise data sequence a US is inserted after the GS or RS. The END MDSE END RETURNS key is locked out after a discount. Discount is locked out after a deposit.
END TRANSACTION
GS | TOTAL 8 | RS | ACCOUNT NO. 14 | US | CREDIT AUTHORIZATION CODE 1 | RS | FS
End transaction segment with account number.
GS | TOTAL 8 | RS | ACCOUNT NO. 14 | US | FS
If no Credit Authorization.
GS | TOTAL 8 | RS | FS
End transaction segment without account number.

Figure E-1 Merchandise transaction format

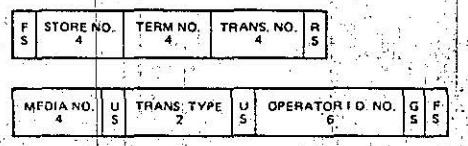


Figure E-2 Non-sale, re-entry, and programming format

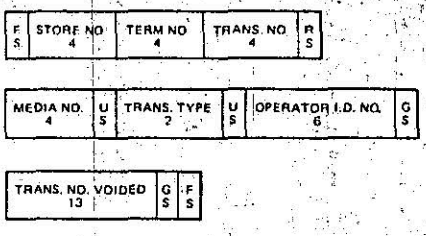


Figure E-3 Void transaction format

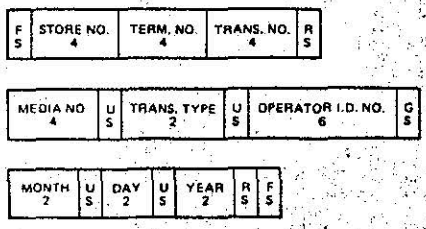


Figure E-4 Cashier or clerk opening transaction format

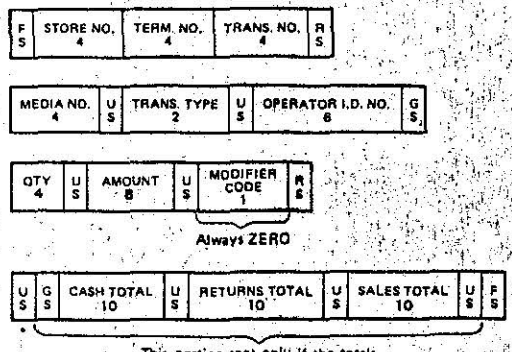
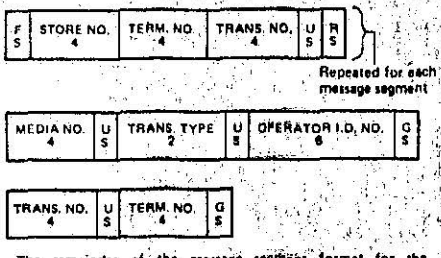


Figure E-5 Closing operation format



The remainder of the message segment format for the re-entered transaction is the same as in a normal transaction of the same type.

Figure E-6 Re-entered transaction format

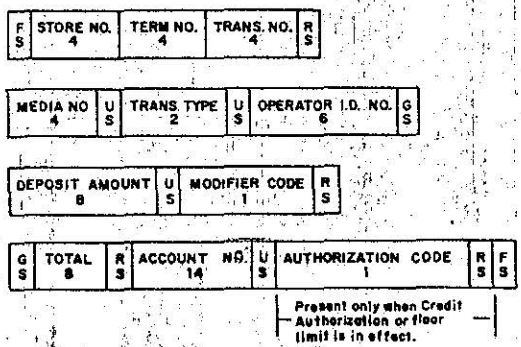


Figure E-7 Receive on account transaction format

723 DATA COLLECTION

Characters transferred between the 280 and 723 are formatted into bit configurations suitable for transmission on data communication lines. These characters are grouped into three types: data characters, data separator characters, and control characters.

A character is made up of 10 binary bits with the state of the bits determining the mnemonic of the character. The first or least significant bit position of a character is the start bit and is always zero. The next seven bit positions contain a standard ASCII data character code. The next bit position of a character contains a parity bit which provides even parity for the seven ASCII bits. The last or most significant bit position of a character is the stop bit and is always a logic ONE. The period of time between the stop bit of one character and the start bit of the next varies. During this time period the communication line is in a constant mark state (logic one). Figure E-8 depicts the character format of the characters transferred on the communication lines.

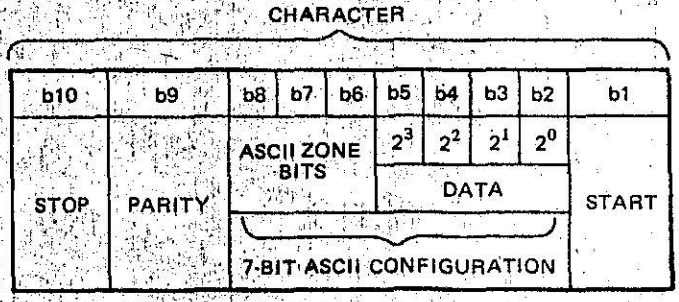


Figure E-8 Character format

The data and data separator characters are stored in the DC buffer in the 280 read/write memory before transmission to the 723. This information is stored in packed hexadecimal form. When ready for transmission, the 280 TCU pulls the four bit characters from the buffer, adds the ASCII zone bits, and sends the seven-bit ASCII character to the TCA. The TCU also sends seven-bit ASCII control characters to the TCA as required for message format. Upon receipt of the seven-bit characters from the TCU, the TCA adds a start bit, even parity bit, and stop bit to complete the character format shown in figure E-8. The ten bit characters are then

Table E-3 Character codes

ASCII EQUIVALENT CHARACTER	PROGRAM EQUIVALENT CHARACTER	CHARACTER: STOP BIT b10	PARITY b9	7-BIT ASCII b8	b7	b6	b5	b4	b3	b2	START BIT b1	CONFIGURATION RECORDED ON TAPE b4	b3	b2	b1	TAPE CHARACTER
0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
1	1	1	1	0	1	1	0	0	0	1	0	0	0	0	1	1
2	2	1	1	0	1	1	0	0	1	0	0	0	0	1	0	2
3	3	1	0	0	1	1	0	0	1	1	0	0	0	1	1	3
4	4	1	1	0	1	1	0	1	0	0	0	0	1	0	0	4
5	5	1	0	0	1	1	0	1	0	1	0	0	1	0	1	5
6	6	1	0	0	1	1	0	1	1	0	0	0	1	1	0	6
7	7	1	1	0	1	1	0	1	1	1	0	0	1	1	1	7
8	8	1	1	0	1	1	1	0	0	0	0	1	0	0	0	8
9	9	1	0	0	1	1	1	0	0	1	0	1	0	0	1	9
	A	1	0	0	1	1	1	0	1	0	0	1	0	1	0	A
	B	1	1	0	1	1	1	0	1	1	0	1	0	1	1	B
FS	FS	1	1	0	0	1	1	1	0	0	0	1	1	0	0	C
GS	GS	1	0	0	0	1	1	1	0	1	0	1	1	0	1	D
RS	RS	1	0	0	0	1	1	1	1	0	0	1	1	1	0	E
US	US	1	1	0	0	1	1	1	1	1	0	1	1	1	1	F
STX	STX	1	1	0	0	0	0	0	1	0	0	NOT RECORDED				
ETX	ETX	1	0	0	0	0	0	0	1	1	0					
ACK	ACK	1	0	0	0	0	0	1	1	0	0					
NAK	NAK	1	1	0	0	1	0	1	0	1	0					
ENQ	ENQ	1	0	0	0	0	0	1	0	1	0					
DLE	DLE	1	1	0	0	1	0	0	0	0	0					
EOT	EOT	1	1	0	0	0	0	1	0	0	0					
SO	SO	1	1	0	0	0	1	1	1	0	0					

sent to the modem for transmission to the 723. Table E-3 lists the ASCII codes used in 280-723 transmissions. The 723 records on tape only the first four bits of the data and data separator characters. The control characters are not recorded.

Data transmissions between the 280 and the 723 use the following standard ASCII control characters.

STX (Start-of-Text) This character is always the first character transmitted to the 723. It indicates the beginning of the message segment.

ETX (End-of-Text) This character indicates the end of a message segment. An ETX follows the message and is followed immediately by a BCC (Block Check Character).

ACK (Positive Acknowledgement) This character indicates that the message received from the 280 by the 723 contains no transmission errors. An ACK is transferred from the 723 to the 280 if the parity and BCC of the message have checked out okay.

NAK (Negative Acknowledgement) This character indicates that an error occurred during the transferring of a message from the 280 to the 723. A NAK is transferred from the 723 to the 280 if either bad parity or a bad BCC is detected by the 723 during message transfer.

ENQ (Enquiry) This character indicates that no response (ACK or NAK) has been received from the 723 after transferring a message. An ENQ is sent from the 280 to the 723 if the 723 does not respond with either an ACK or NAK after receiving the message from the 280.

EOT (End-of-Transmission) This character indicates that the 723 has acknowledged correct receipt of information from the 280. An EOT is transferred from the 280 to the 723 after the 280 has received an ACK from the 723.

DLE (Data Link Escape) This character followed by an EOT is an indicator telling the 280 to drop the communication line. A DLE-EOT is transferred from the 723 after the 280 has sent an EOT to the 723. If the 280 does not receive DLE-EOT within 29 msec. after transmitting EOT, the 280 drops the communication line and regards the transmission as good.

SO (Shift Out) This character is sent as the first character of the data message when operating in diagnostic mode. The SO character tells the 723 not to encode the data message on tape.

All data messages are preceded by an STX and followed by an ETX-BCC as illustrated in figure E-9.

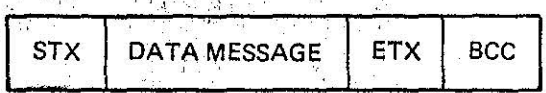


Figure E-9 General message format

DATA COLLECTION COMMUNICATION SEQUENCES

The 280 retail system communications use the terminal demand call-up and hang-up procedures which permit the 280 to originate and terminate communications with the 723. The purpose in establishing communications with the 723 is to create a path for the transaction data to follow. When the transaction data has been successfully transmitted to the 723, the 280 drops the established path (terminates communications) to the 723 and permits the 723 to react to the demand of another 280. The sequence in which transaction data is transferred is controlled by the firmware program of both the 280 and 723.

NORMAL COMMUNICATION SEQUENCE

The normal communication sequence employed during the transfer of data from the 280 to the 723 assumes that no errors are encountered. Figure E-10 illustrates this normal communication sequence.

Establishing A Communication Line

The 280, having transaction data ready to transmit, establishes a communications path to the 723. The 280 turns ON input carrier and transmits a constant mark signal to the 723. The 723, detecting input carrier from the 280 and not being busy, turns ON the output carrier and transmits a constant mark signal to the 280. The 280 detects the output carrier signal and assumes that a communication line is established. The time-out while waiting to establish a line is programmable from 4 to 60 seconds in steps of 4 seconds each. After the time has expired, the terminal assumes the offline mode of operation.

Transferring Transaction Data

Having established a communication line to the 723, the 280 transfers the transaction data to the 723. The 280 transfers the control character STX (Start-of-Text) to the 723, indicating that the data message is ready to be transferred. After transferring STX, the 280 transmits the entire data message which contains the transaction data to be encoded on tape at the 723. During the transfer of the data message, the 280 generates a Block Check Character (BCC) count which is a longitudinal parity check of the data message content. The 723 generates a BCC count and also checks the parity of each character as it is received from the 280. After having transmitted the data message, the 280 transfers an ETX (End-of-Text) control character followed by a BCC to the 723. The 723 compares the BCC received from the 280 with the one it has created from its own BCC count. If the BCC created by the 723 is the same as the BCC received from the 280 and there is no character parity error, the 723 transmits an ACK (Positive Acknowledgement) control character to the 280. If an error has occurred in either the BCC compare or the parity check, the 723 transmits a NAK (Negative Acknowledgement) control character instead of an ACK. The 280 having received an ACK from the 723, transmits an EOT (End-of-Transmission) control character to the 723. The 723 receives the EOT from the 280 then transmits a DLE (Data Link Escape) control character followed by an EOT to the 280. The 280, receiving DLE-EOT, drops the communication line. If the 280 does not receive DLE-EOT within 29 msec. after transmitting an EOT, it drops the communication line and regards the data message transfer as good.

Dropping The Communication Line

After transferring the transaction data and receiving DLE-EOT, the 280 terminates the call by dropping the communication line to the 723. To accomplish this, the 280 turns OFF the input carrier signal to the 723. The 723, detecting the absence of input carrier, turns OFF the output carrier to the 280 and scans the next sequential 280 position.

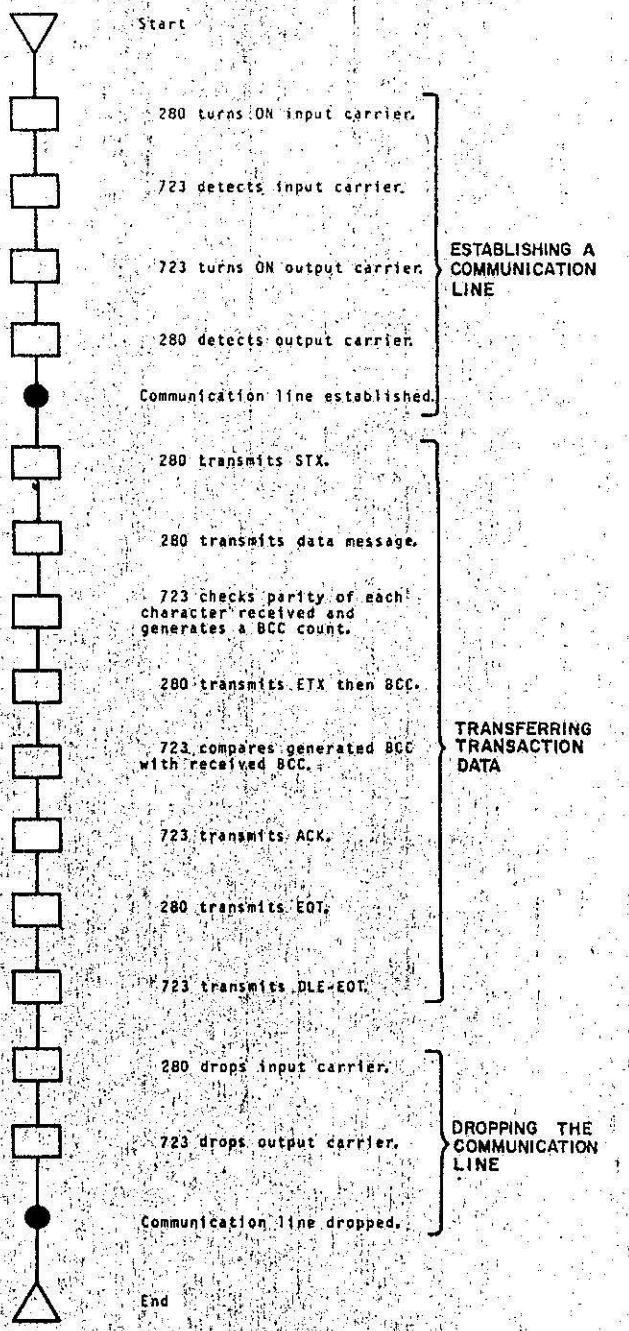

Start
280 turns ON input carrier.
723 detects input carrier.
723 turns ON output carrier.
280 detects output carrier.
Communication line established.
ESTABLISHING A COMMUNICATION LINE
280 transmits STX.
280 transmits data message.
723 checks parity of each character received and generates a BCC count.
280 transmits ETX then BCC.
723 compares generated BCC with received BCC.
723 transmits ACK.
280 transmits EOT.
723 transmits DLE-EOT.
TRANSFERRING TRANSACTION DATA
280 drops input carrier.
723 drops output carrier.
Communication line dropped.
DROPPING THE COMMUNICATION LINE
End

Figure E-10 Normal communication sequence (no error)

3NT

COMMUNICATION SEQUENCE WITH A DATA MESSAGE ERROR (TYPE 3 ERROR)

A data message error occurs if the 723 detects bad parity in any character in the data message or the BCC does not compare (refer to figure E-11). The 723, having detected a data message error, transmits a NAK to the 280. The 280 retransmits the same data message to the 723 in an attempt to achieve an ACK response from the 723. If the data message is transmitted three times and a NAK is received each time, the 280 drops the communication line and times out (100 msec.); the 280 re-establishes the communication line and again transmits the same data message. If, after transmitting the same data message three more times NAK's are still being received, the 280 drops the communication line and goes offline. This results in a type 3 communication error type out being printed on the journal tape (/////3NT/////). If, during the communication sequence shown in figure E-11, an ACK is received by the 280, indicating a correct data message transmission, the communication sequence followed is the same as that shown in figure E-10.

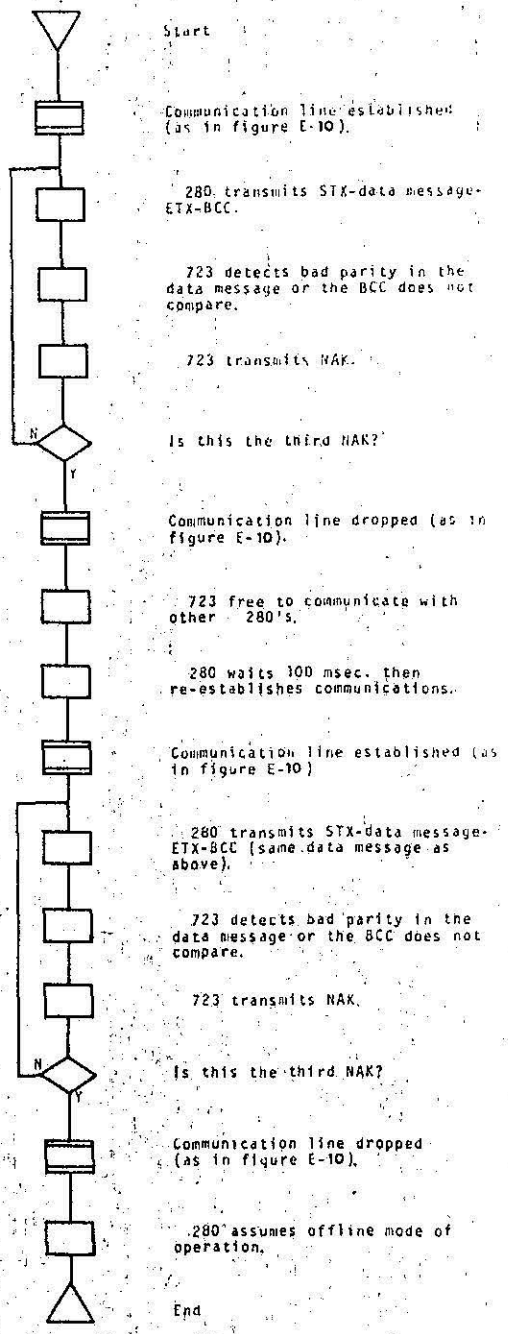
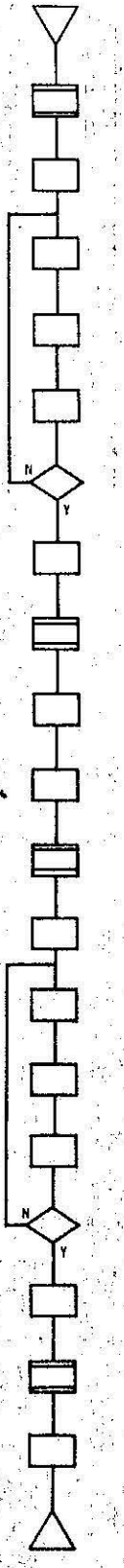

Start
Communication line established (as in figure E-10).
280 transmits STX-data message-ETX-BCC.
723 detects bad parity in the data message or the BCC does not compare.
723 transmits NAK.
Is this the third NAK?
N
Y
Communication line dropped (as in figure E-10).
723 free to communicate with other 280's.
280 waits 100 msec. then re-establishes communications.
Communication line established (as in figure E-10)
280 transmits STX-data message-ETX-BCC (same data message as above).
723 detects bad parity in the data message or the BCC does not compare.
723 transmits NAK.
Is this the third NAK?
N
Y
Communication line dropped (as in figure E-10).
280 assumes offline mode of operation.
End

Figure E-11 Communication sequence with a data message error (type 3 error)

4NT

COMMUNICATION SEQUENCE WITH NO REPLY FROM 723 (TYPE 4 ERROR)

If the 723 does not respond with either an ACK or a NAK after receiving the data message, the communication sequence followed is as shown in figure E-12. The 280, not receiving an ACK or NAK within 100 msec. after transmitting a data message, transmits an ENQ to the 723. The 280, having sent three ENQ's, and timing out 100 msec. between each, drops the communication line and times out 100 msec. The 280 re-establishes a communication line to the 723, sends the same data message, and waits again for a reply from the 723. If no reply is received after sending three more ENQ's, the 280 drops the communication line and goes offline. A type 4 communication error typeout is printed on the journal tape (/////4NT/////). If a reply is received during the communication sequence shown in E-12, the communication sequence shown in figure E-10 is followed for the remainder of the transmission.



Start

Communication lines established (as in figure E-10).

280 transmits STX - data message - ETX-BCC.

723, due to a failure, does not reply with ACK or NAK.

280 waits 100 msec. for reply.

280 transmits ENQ.

Is this the third ENQ transmitted

280 waits 100 msec. for reply.

Communication line dropped (as in figure E-10).

723 free to communicate with other 280's.

280 waits 100 msec. then re-establishes communications.

Communication line established (as in figure E-10).

280 transmits STX - data message - ETX-BCC (same data message as above)

723, due to failure, does not reply with ACK or NAK.

280 waits 100 msec. for reply.

280 transmits ENQ.

Is this the third ENQ transmitted?

280 waits 100 msec. for reply.

Communication line dropped (as in figure E-10).

280 assumes offline mode of operation.

End

Figure E-12 Communication sequence with no reply from the 723 (type 4 error)

DATA COLLECTION COMMUNICATION ERRORS

Communication errors may occur during the transfer of transaction data between the 280 and 723 which result in a printout on the journal tape. Seven types of error conditions are detected and acted upon by the 280. Five types of these error conditions result in the 280 going offline. The other two types are printed on the journal tape only during diagnostic operation. These printouts consist of a series of slashes, an error code, an NT, more slashes, and a hash total which is the sum of the sales and returns totals.

ERROR TYPES

Following is a list of the types of errors detected during data collection communication sequences, and an explanation of each type.

Type 1

A type 1 error indicates that the 280 has received one NAK from the 723, and after retransmitting the data message, an ACK has been received. The presence of this error type does not cause the 280 to go offline and is indicated only in diagnostic mode of 280 operation. It results in /////1NT///// being printed on the journal tape to indicate to the Technical Service Representative an occurrence of a type 1 error.

Type 2

A type 2 error indicates that the 280 has received two NAK's from the 723 during the communication sequence, and after the third transfer of the data message, an ACK has been received. As in a type 1 error, this error condition does not cause the 280 to go offline and is indicated only during diagnostic mode of 280 operation. The resultant journal tape printout for a type 2 error is /////2NT/////.

Type 3

A type 3 error indicates that six NAK's (three NAK's if in diagnostic mode) have been received by the 280 during six attempts to transfer the same data message. The sequence followed for a type 3 error is shown in figure E-11. The occurrence of a type 3 error results in the 280 going offline. The resultant journal tape printout is /////3NT/////.

Type 4

A type 4 error indicates that six ENQ's (three ENQ's if in diagnostic mode) have been transmitted to the 723 as shown in figure E-12. The occurrence of a type 4 error results in the 280 going offline. The resultant journal tape printout is /////4NT/////.

Type 5

A type 5 error indicates that two unexpected EOT's (one unexpected EOT if in diagnostic mode) have been received by the 280 during the communication sequence. When expecting a reply (ACK or NAK) to a transferred data message, the 280 receives an EOT or a DLE-EOT from the 723. This action results in the 280's re-establishing a line and retransmitting the data message. If another EOT or DLE-EOT is received after retransmitting the same data message, the 280 goes into offline mode of operation. The resultant journal tape printout is /////5NT/////.

Type 6

A type 6 error indicates that the output carrier has dropped twice (once if in diagnostic mode) on the same message. The 280 monitors the output carrier every 20 msec. and drops the input carrier if the output carrier drops. When this occurs, the 280 waits 100 msec., re-establishes a line, and retransmits the same data message. If the output carrier drops again during the retransmission of the same data message, the 280 goes into offline mode of operation. The resultant journal tape printout is /////6NT/////.

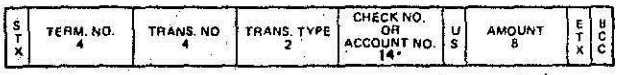
Type 7

A type 7 error indicates that the 280 has not been able to establish a communication line to the 723 within the time established in the 4- to 60-second time-out. The 280 turns on the input carrier then waits for the output carrier from the 723 to establish a communication line. If, after waiting the programmed amount of time and the output carrier is not received, the 280 goes into offline mode of operation. The resultant journal tape printout is /////7NT/////.

NOTE: During diagnostic operation, a communication sequence completed with no errors results in a journal tape printout of /////0NT/////.

CREDIT AUTHORIZATION MESSAGE FORMATS

Credit authorization messages, like data collection messages, are preceded by an STX and followed by an ETX-BCC. Figure E-13 depicts an input message format, and figure E-14 depicts an output message format.



The transaction type indicates to the credit authorization system software whether this is a credit account or a check number inquiry. A transaction type of 01 is sent to indicate check authorization.

* If a check number is being transferred, the maximum field size is 12 digits with 2 leading ZEROS and the US is not transferred. This makes a total of 14 digits. If an account number is transferred, the maximum field size is 14 digits and the US is transferred.

Figure E-13 Input credit authorization format

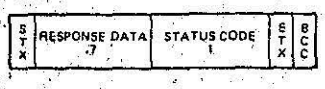


Figure E-14 Output credit authorization format

CREDIT AUTHORIZATION COMMUNICATION SEQUENCES

The 280 originates calls to the central file via the 723 for credit or check authorization. The procedures are similar to those used during data collection except that after the 280 has sent the data message, received an ACK, and sent an EOT, the 280 then acts as the called station and expects a data message as a reply. The 280 turns ON the input carrier and the auxiliary channel signal (ACS) to establish

communications to the central file. The ACS signals the 723 that this is a credit authorization sequence and the 723 responds with output carrier as in data collection. The 723 is transparent to the data communication between the 280 and the central file. The normal credit authorization communication sequence is depicted in figure E-15.

After successful transmission, the 280 sends an EOT to central and holds the line waiting a message reply from the central file. The central file responds with a data message, and after receiving an ACK from the 280, sends an EOT or DLE-EOT to the 280. This terminates the call, the 280 drops input carrier and ACS, and output carrier is dropped. A call is also terminated anytime the central file sends DLE-EOT or EOT except when the 280 is waiting for a data message. If the credit authorization system is down, the data collector may still be operable. The data collector scans terminals for data collection and credit authorization communications independently.

The time-out while waiting to establish a line is the same as that used during data collection. This is the 4- to 60-second programmable time-out.

The time-out used by the 280 to wait for an ACK or NAK response from the central file after the 280 sends a data message is programmable to be either 100 msec. or 5.1 seconds. The 100 msec. time-out is used when going to an NCR based credit file and 5.1 seconds is used when going to an IBM 360.

The time-out used by the 280 when waiting for an output message from the central file after the 280 has sent an EOT is programmable from 3 to 45 seconds.

The time-out used by the 280 after sending an ACK and waiting for an EOT or DLE-EOT is 500 msec. If this timer times out, the 280 treats the reply as a good message and terminates the call.

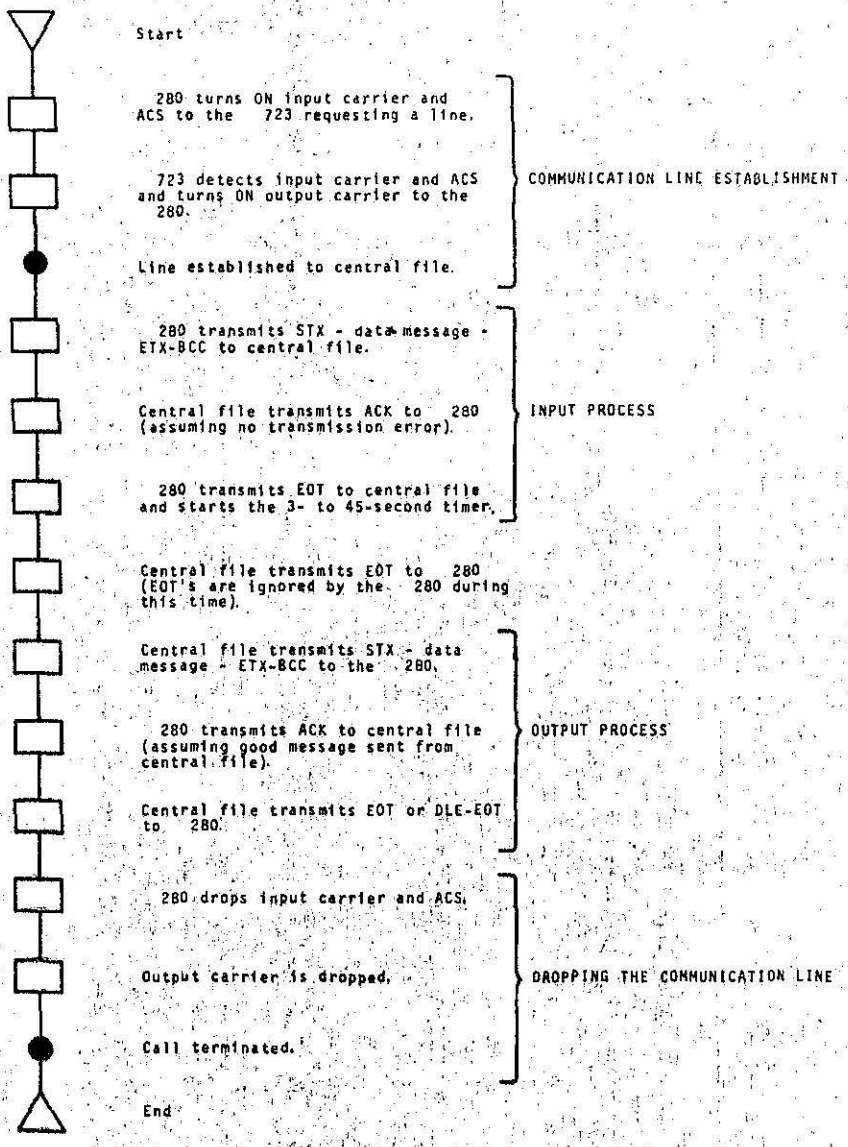

Start
280 turns ON input carrier and ACS to the 723 requesting a line.
723 detects input carrier and ACS and turns ON output carrier to the 280.
Line established to central file.
COMMUNICATION LINE ESTABLISHMENT
280 transmits STX - data message - ETX-BCC to central file.
Central file transmits ACK to 280 (assuming no transmission error).
280 transmits EOT to central file and starts the 3- to 45-second timer.
INPUT PROCESS
Central file transmits EOT to 280 (EOT's are ignored by the 280 during this time).
Central file transmits STX - data message - ETX-BCC to the 280.
280 transmits ACK to central file (assuming good message sent from central file).
Central file transmits EOT or DLE-EOT to 280.
OUTPUT PROCESS
280 drops input carrier and ACS.
Output carrier is dropped.
Call terminated.
DROPPING THE COMMUNICATION LINE
End

Figure E-15 Normal credit authorization communication sequence

CREDIT AUTHORIZATION COMMUNICATION SEQUENCE WITH NO REPLY FROM THE CENTRAL FILE

If the central file does not acknowledge this receipt of the input message by replying with an ACK or NAK, the communication sequence followed is that shown in figure E-16. The communications path is established between the 280 and the central file. The 280 transmits the data message, then waits either 100 msec. or 5.1 seconds for a reply from the central file. If no reply is received within the time limit, the 280 transmits an ENQ to the central file. The procedure is repeated three times with the 280 waiting the prescribed amount of time then sending ENQ. If, after sending three ENQ's no reply has been received, the 280 drops the communication line. The 280 then waits 100 msec., which permits the credit authorization system to scan another 280 position, then re-establishes a communication path to central. The 280 transmits the data message, and if no reply is received after three ENQ's are sent, the 280 drops the communication line and enters credit authorization offline mode. If the 280 receives a reply during the sequence shown in figure E-16, the communication process resumes normally as is shown in figure E-15.

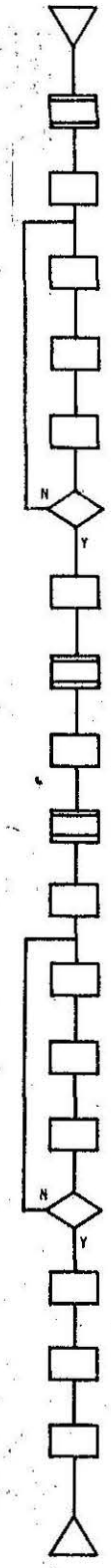

Start
Communication line established as in figure E-15.
280 transmits STX - data message - ETX-BCC.
Due to a failure, the central file does not reply with ACK or NAK.
280 waits 100 msec. or 5.1 seconds for reply.
280 transmits ENQ.
N
Is this the third ENQ transmitted?
Y
280 waits 100 msec. or 5.1 seconds for reply.
Communication line dropped as in figure E-15.
280 times out 100 msec.
Communication line established as in figure E-15.
280 transmits STX - data message - ETX-BCC.
No ACK or NAK reply from central file.
280 waits 100 msec. or 5.1 seconds for reply
280 transmits ENQ.
N
Is this the third ENQ transmitted?
Y
280 waits 100 msec. or 5.1 seconds for reply.
Communication line dropped as in figure E-15.
280 assumes the credit authorization offline mode.
End

Figure E-16 Credit authorization sequence with no reply from the central file

CREDIT AUTHORIZATION COMMUNICATION SEQUENCE WITH A BAD INPUT MESSAGE

If the central file responds to an input message with a NAK, the central file has detected either bad parity or the BCC does not compare in the input message. This sequence is shown in figure E-17. The communication line is established, and the 280 transmits the data message. If a NAK is received in response to the data message, the 280 retransmits the message. After transmitting data messages and receiving NAK's three times, the 280 drops the communication line, waits 100 msec., then re-establishes communication to the central file. Three more attempts are made to successfully transfer the data message. The communication line is dropped and the 280 assumes the credit authorization offline mode. If the data message is received correctly during the process, an ACK is received and the communication sequence continues as shown in figure E-15.

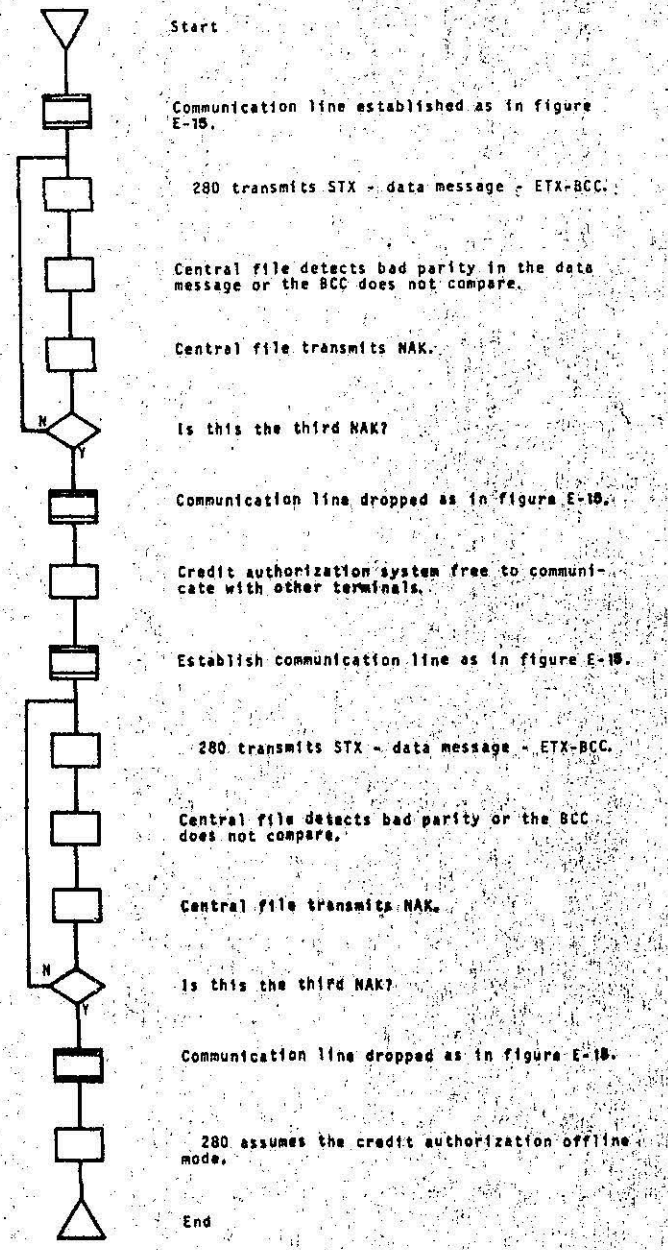

Start
Communication line established as in figure E-15.
280 transmits STX - data message - ETX-BCC.
Central file detects bad parity in the data message or the BCC does not compare.
Central file transmits NAK.
Is this the third NAK?
N
Y
Communication line dropped as in figure E-15.
Credit authorization system free to communicate with other terminals.
Establish communication line as in figure E-15.
280 transmits STX - data message - ETX-BCC.
Central file detects bad parity or the BCC does not compare.
Central file transmits NAK.
Is this the third NAK?
N
Y
Communication line dropped as in figure E-15.
280 assumes the credit authorization offline mode.
End

Figure E-17 Credit authorization sequence with a bad input message

CREDIT AUTHORIZATION SEQUENCE WITH A BAD OUTPUT MESSAGE

If the central file transmits an output message containing either bad parity or BCC, the 280 transmits a NAK to the central file. The central file, having received a NAK from the 280, retransmits the output message. Output messages are transferred from the central file until either the message is good or the 3- to 45-second timer times out. If the message is good, the 280 transmits an ACK and the sequence proceeds as shown in figure E-15. If the 3- to 45-second timer times out, the 280 drops the line and enters the credit authorization offline mode.

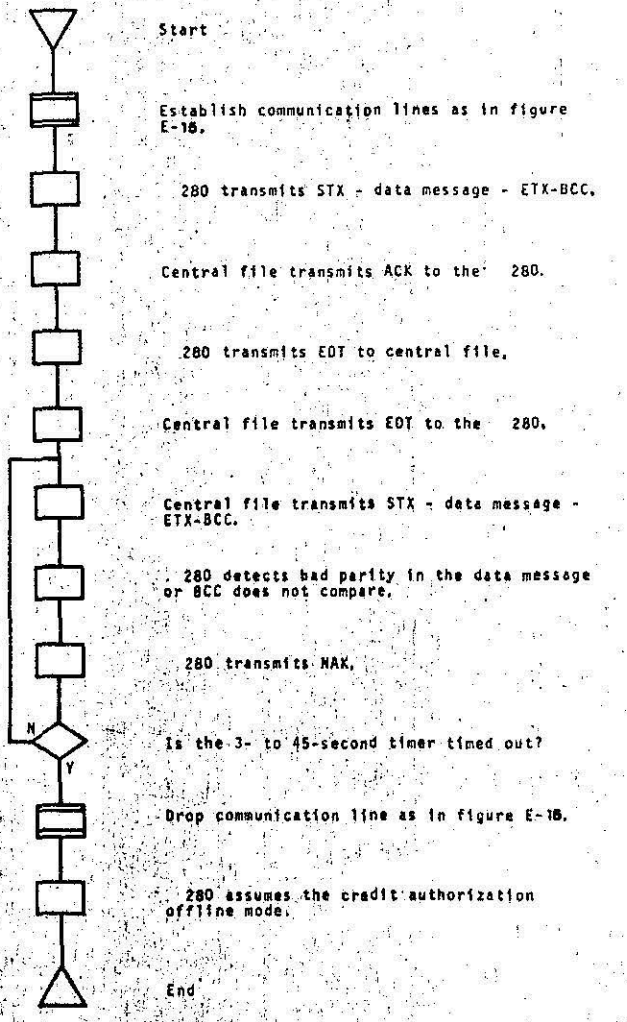

Start
Establish communication lines as in figure E-15.
280 transmits STX - data message - ETX-BCC.
Central file transmits ACK to the 280.
280 transmits EOT to central file.
Central file transmits EOT to the 280.
Central file transmits STX - data message - ETX-BCC.
280 detects bad parity in the data message or BCC does not compare.
280 transmits NAK.
Is the 3- to 45-second timer timed out?
N
Y
Drop communication line as in figure E-15.
280 assumes the credit authorization offline mode.
End

Figure E-18 Credit authorization communication with a bad output message

CREDIT AUTHORIZATION COMMUNICATION ERRORS

Errors may occur during the credit authorization communication sequence which result in the terminal going into credit authorization offline mode. The following is a list of the credit authorization communication errors that cause the 280 to go offline.

1. Failure to establish a communication line within the 4- to 60-second time-out.
2. Six NAK's have been received by the terminal for the same input message (refer to figure E-17).
3. Six ENQ's have been transmitted by the 280 for the same message (refer to figure E-16).
4. Two unexpected EOT's have been received by the 280 during the 3- to 45-second time-out while waiting for an output message.
5. The output carrier has been dropped twice on the same message.
6. No output message has been received within the 3- to 45-second time-out for the second time. After the first time out the 280 drops the line, raises it again, and retransmits the input message.
7. The 3- to 45-second timer has timed out after receiving part of the output message or the output message is in error (refer to figure E-18).

When the terminal is in the credit authorization offline mode for any of the reasons listed above, the floor limit type of authorization is used when programmed. If the terminal is offline due to failure to establish communications during data collection, it is also offline for credit authorization, and no attempt is made to communicate to the central file at the time of account number entry. If communications could not be established to the central file, the 280 keeps input carrier and ACS on during the transaction. As soon as a line is established, the terminal drops the input carrier and ACS. Communication to the central file proceeds as normal at the next credit authorization request. Credit authorization communication recovery is attempted only during a transaction while data collection recovery is attempted between transactions.

761 DATA COLLECTION

The data and data separator characters to be transmitted to the 761 Cassette Terminal Recorder (CTR) are stored in the DC buffer in the 280 read/write memory. The characters are stored in ASCII form. Bits 1 through 7 contain the ASCII Code and bit 8 is the even parity bit. When ready for transmission, the TCU pulls the eight bit character from the buffer and transmits it, without change, to the 761. Transmission to the 761 is in accordance with common port communications specifications. The 761 records the entire eight bit character on magnetic tape.

LABEL AND FILE MARK

Under direction of the TCU, a label and a file mark (FM) are written at the beginning of a new (pre-erased) tape. The label and file mark are also written after a power-up occurs and after a 761 inoperative condition has been cleared. The file mark consists of 16 ZERO bits preceded by a preamble and followed by a postamble. The label is stored in the programmable portion of the read/write memory in ASCII form. The customer determines what information is to be included in the label.

INOPERATIVE CONDITIONS

The 761 may become inoperative because of loss of power, hardware failure, or improper operator action. The improper operator action may be (1) turning the 761 power switch off, (2) opening the cassette cover, or (3) changing the tape when not requested.

The 280 uses various indications to inform the operator that the 761 is inoperative and action is required. These indications are audible tones, the COMM ALERT descriptor, and codes displayed on the operator display panel. The codes displayed on the operator display and the possible action which may be taken to correct the inoperative condition are as follows.

0	Change tape.
0-6	Finish changing tape. Turn on CTR. Close cassette cover. Enter "6" and go offline.
6	Close cassette cover. Turn on CTR. Insert cassette tape. Enter "6" and go offline.
7-8	Enter "7" to continue recording on same tape. Enter "8" to terminate tape for removal.

If the 280 receives an incorrect status code from the 761 (one that is not expected or accounted for at a particular time), the terminal goes offline and remains offline until powered down. When powered back up, the terminal will attempt to recover from the offline condition. The incorrect status is usually caused by a hardware failure in the 761. While offline because of an incorrect status, the tape is not moved. This prevents loss of data which might occur because of hardware failure.

Figures E-19 and E-20 describe the terminal action when the 761 becomes inoperative between transactions and during a transaction.

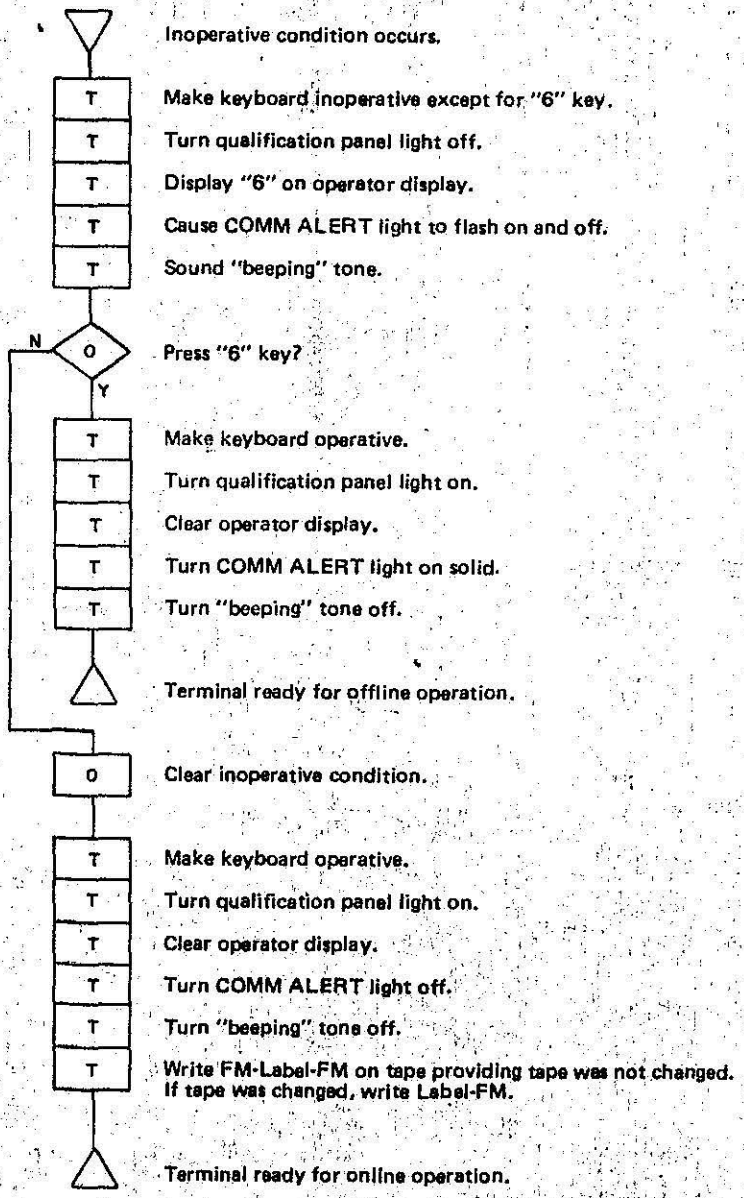
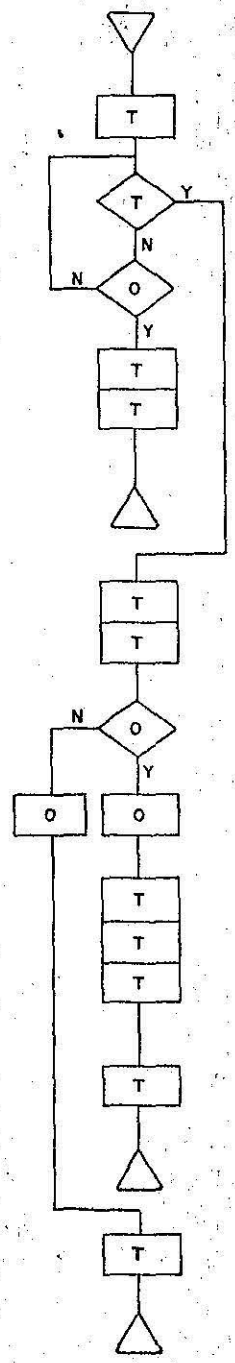


Fig. E-19 761 becomes inoperative between transactions



Inoperative condition occurs.

Turn on solid tone.

DC Buffer filled?

Clear inoperative condition?

Turn off solid tone.

Write FM-Label-FM on tape providing tape was not changed.
If tape was changed, write Label-FM.

Transaction will be online.

Go offline.

Turn off solid tone.

Clear inoperative condition?

Complete transaction.

Turn COMM ALERT light on solid.

Scund tone for "transaction has been offline", if programmed.

Write FM-Label-FM on tape providing tape was not changed.
If tape was changed, write Label-FM.

Turn COMM ALERT light off.

Ready for online operation.

Sound tone for "transaction has been offline", if programmed.

Go to "inoperative condition occurs" in figure E-19.

Fig. E-20 761 becomes inoperative during transaction

OFFLINE CODES

When a transaction has been performed offline, the 280 prints an offline code on the journal tape at the end of the transaction. An example of an offline code printout is as follows.

/////3NT/////

The NT means "not transmitted" and the code 3 represents the reason for the offline condition. Following is a list of the offline codes used with the 761.

Code	Reason
0	Wrote successfully first time.
1	Wrote successfully first retry.
2	Wrote successfully second retry.
3	Cannot write in three attempts.
6	761 in inoperative condition.
7	Power off at 761.
8	No 761 on port.
9	Bad status.

Codes 0, 1, and 2 are only printed during diagnostics. Code 8 can also mean that a customer's tape is present during diagnostics.

TERMINAL REQUEST FOR NEW TAPE

The terminal will request that a new tape be inserted in the 761 when any of the following conditions occur.

- End of tape (EOT) mark is sensed.
- End clear leader (ECL) is sensed.
- Failure to achieve a good write in three attempts.
- Operator requests a termination of a tape after a closing transaction.
- Write enable plug not present on cassette.

The terminal action for requesting a new tape is as follows.

- Display "0" on operator display.
- Sound "beeping" tone.
- Flash COMM ALERT light on and off.

When the operator lifts the cover to remove the old tape, a "0-6" is then displayed on the operator display.

Figure E-21 illustrates the terminal action when the EOT mark is sensed. If, ECL is sensed without EOT being sensed, the terminal action is the same except for the erase from EOT to ECL. The terminal action when failure to achieve a good write in three attempts occurs is shown in figure E-22. Figure E-23 illustrates how the operator requests a new tape after a closing transaction in which the read or reset keys were used.

TAPE TERMINATION

The 761 tape must be terminated so that the reading unit knows when all information on the tape has been read. The tape is considered terminated when a double file mark is read, when no information is encountered in 19.7 inches of tape, or when ECL is detected.

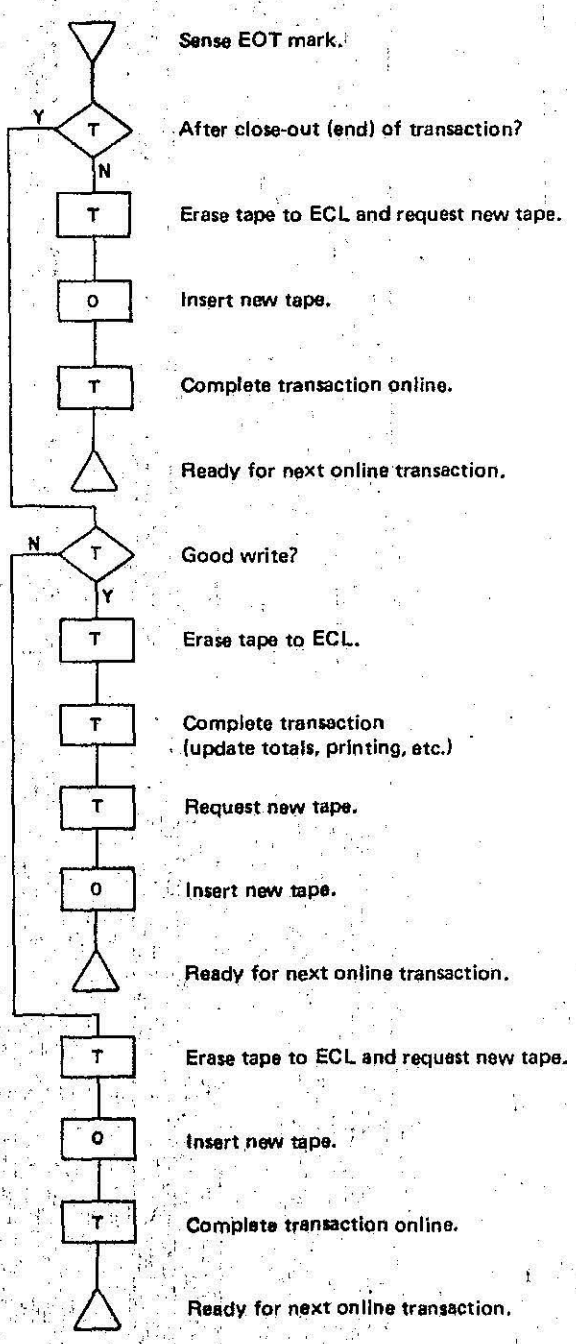


Fig. E-21 Terminal action when EOT is sensed

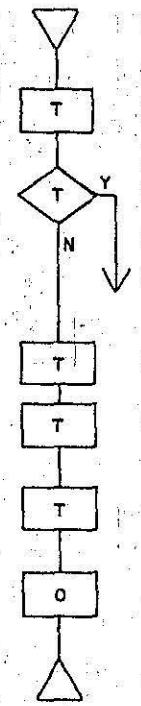


Fig. E-22 Failure to accomplish good write after three attempts

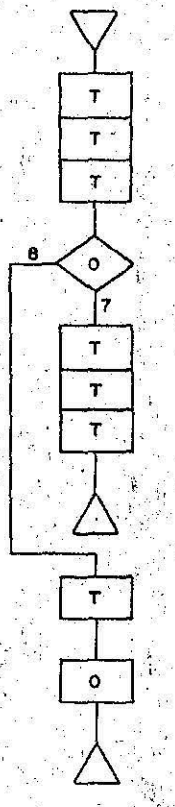


Fig. E-23 Operator request for new tape at closing transaction

APPENDIX

This appendix contains three programming samples illustrating the use of (1) department mnemonics, (2) transaction type mnemonics, and (3) expanded department mnemonics. The contents of Sectors "0," "1" and "2" are provided for all locations accessible in the programming mode. Sector "3" is not included since it does not contain any programmable locations. Sample printouts and a brief analysis follow each program.

DEPARTMENT MNEMONICS SECTOR "0"

000/017	050/145	120/104	170/000
001/074	051/377	121/200	171/022
002/023	052/065	122/007	172/000
003/105	053/063	123/014	173/200
004/025	054/002	124/014	174/307
005/166	055/006	125/300	175/000
006/101	056/073	126/077	176/001
007/000	057/145	127/330	177/111
010/023	060/215	130/363	200/126
011/102	061/065	131/363	201/000
012/004	062/074	132/000	202/000
013/022	063/145	133/000	203/003
014/103	064/032	134/000	204/063
015/007	065/065	135/000	205/002
016/030	066/044	136/077	206/200
017/265	067/003	137/330	207/012
020/377	070/010	140/363	210/032
021/015	071/144	141/368	211/004
022/043	072/043	142/100	212/165
023/115	073/076	143/252	
024/053	074/041	144/021	
025/071	075/000	145/021	
026/072	076/204	146/042	
027/073	077/045	147/021	
030/074	100/156	150/042	
031/065	101/010	151/021	
032/000	102/042	152/042	
033/061	103/317	153/021	
034/071	104/051	154/042	
035/105	105/043	155/021	
036/003	106/016	156/042	
037/066	107/011	157/021	
040/071	110/020	160/042	
041/143	111/053	161/021	
042/015	112/066	162/000	
043/024	113/307	163/001	
044/062	114/120	164/001	
045/002	115/351	165/000	
046/006	116/000	166/120	
047/072	117/267	167/020	

DEPARTMENT MNEMONICS SECTOR "1"

000/115	050/110	120/104	170/000
001/104	051/307	121/111	171/000
002/323	052/103	122/101	172/000
003/122	053/123	123/107	173/000
004/124	054/310	124/240	174/000
005/316	055/103	125/103	175/000
006/105	056/117	126/124	176/000
007/122	057/304	127/304	177/000
010/322	060/114	130/057	200/000
011/123	061/127	131/057	201/000
012/124	062/331	132/257	202/000
013/314	063/126	133/116	203/000
014/104	064/117	134/124	204/000
015/111	065/304	135/240	205/131
016/323	066/122	136/104	206/117
017/106	067/117	137/320	207/125
020/105	070/301	140/122	210/122
021/305	071/103	141/124	211/040
022/115	072/123	142/057	212/123
023/123	073/310	143/105	213/124
024/303	074/122	144/330	214/117
025/104	075/123	145/116	215/122
026/105	076/324	146/057	216/105
027/320	077/103	147/123	217/205
030/124	100/123	150/314	220/000
031/101	101/255	151/116	221/000
032/330	102/122	152/057	222/000
033/124	103/124	153/115	223/000
034/124	104/316	154/304	224/000
035/314	105/123	155/000	225/000
036/103	106/114	156/000	226/000
037/122	107/305	157/000	227/000
040/324	110/103	160/000	230/010
041/101	111/116	161/000	231/010
042/124	112/324	162/000	232/264
043/304	113/126	163/000	
044/103	114/117	164/000	
045/104	115/111	165/000	
046/325	116/104	166/000	
047/103	117/240	167/000	

DEPARTMENT MNEMONICS
SECTOR "2"

000/103	060/116	140/000	220/000	300/006	360/007
001/117	061/111	141/003	221/137	301/057	361/010
002/101	062/123	142/203	222/217	302/034	362/054
003/324	063/303	143/010	223/070	303/006	363/007
004/123	064/102	144/000	224/000	304/077	364/011
005/110	065/113	145/004	225/157	305/035	365/055
006/117	066/122	146/204	226/220	306/006	366/007
007/305	067/331	147/014	227/074	307/117	367/377
010/101	070/110	150/000	230/000	310/036	370/056
011/125	071/101	151/005	231/177	311/006	371/011
012/124	072/124	152/205	232/221	312/137	372/377
013/317	073/323	153/020	233/100	313/037	373/057
014/105	074/114	154/000	234/000	314/006	374/037
015/114	075/101	155/006	235/217	315/157	375/130
016/105	076/127	156/206	236/222	316/040	376/103
017/303	077/316	157/024	237/104	317/006	
020/110	100/124	160/000	240/000	320/177	
021/104	101/117	161/007	241/000	321/041	
022/127	102/131	162/207	242/237	322/006	
023/322	103/323	163/030	243/223	323/217	
024/114	104/102	164/000	244/110	324/042	
025/104	105/117	165/010	245/001	325/006	
026/131	106/117	166/210	246/017	326/237	
027/323	107/313	167/034	247/224	327/043	
030/115	110/101	170/000	250/114	330/007	
031/105	111/120	171/011	251/001	331/000	
032/116	112/120	172/211	252/377	332/044	
033/323	113/314	173/040	253/225	333/007	
034/112	114/127	174/000	254/120	334/001	
035/127	115/111	175/020	255/002	335/045	
036/114	116/107	176/212	256/377	336/007	
037/331	117/323	177/044	257/226	337/002	
040/123	120/103	200/000	260/124	340/046	
041/125	121/116	201/037	261/003	341/007	
042/111	122/104	202/213	262/377	342/003	
043/324	123/331	203/050	263/027	343/047	
044/123	124/100	204/000	264/004	344/007	
045/120	125/125	205/057	265/377	345/004	
046/122	126/122	206/214	266/030	346/050	
047/324	127/316	207/054	267/005	347/007	
050/104	130/000	210/000	270/377	350/005	
051/122	131/001	211/077	271/031	351/051	
052/125	132/201	212/215	272/006	352/007	
053/307	133/000	213/060	273/017	353/006	
054/103	134/000	214/000	274/032	354/052	
055/117	135/002	215/117	275/006	355/007	
056/123	136/202	216/216	276/037	356/007	
057/315	137/004	217/064	277/033	357/053	

DEPARTMENT MNEMONICS
SAMPLE PRINTOUTS

```
622/0        280    333     55

41                1        3.61 BKRY
80                1        5.40 BOOK
641               1        2.58 MDS
700               1       36.57 MDS
711               1        6.51 MDS
                          54.67 STL
                          54.67 ATD
                            .00 CDU

7/23/74   1 CSH           54.67 TTL
```

```
623/0        280    333     55

                 10         .50 CNT
                 50       50.00 CNT
                 10      100.00 CNT
                  5      100.00 CNT

RST
          8 CSH 1        227.43
         16 N/SL         227.43
         17 N/MD         227.43
                         227.43 CSH
                         232.43 SLE
                            .00 RTN
///

7/23/74   44            250.50 TTL
```

```
624/0        280    333     55

                            .00 STL
RST       DP 1            55.68
RST       DP 2            10.26
RST       DP 6            15.07
RST       DP 8             2.15
RST       DP 11            6.12
RST       DP 12            7.41
RST       DP 14            3.61
RST       DP 18            5.40
RST       DP 20           70.58
RST       DP 23            3.65
RST       DP 26            6.84
RST       DP 30            2.58
RST       DP 36           36.57
RST       DP 46            6.51

7/23/74   46                .00 TTL
```

DEPARTMENT MNEMONICS ANALYSIS

This program uses department mnemonics only. Location 374, Sector "2" is programmed 00011111 (037). This indicates to the firmware that transaction type mnemonics and expanded department mnemonics are not used.

Department mnemonics are programmed in Sector "2" in locations 000-127. Location 210, Sector "0," is programmed 00011010 (032) to specify a print column address of 26 for the department mnemonics. Location 211, Sector "0," has bit 4 reset (0) to cause the department mnemonic to print on the same line as the item information. Location 064, Sector "0," specifies a print column address of 26 for the merchandise entry mnemonic. The merchandise entry mnemonic is programmed in locations 000-002, Sector "1," to be MDS. Therefore, both MDS and the department mnemonics are programmed to print left justified to column 26. However, the department mnemonic is loaded into the printer buffer after the merchandise entry mnemonic and will cancel the MDS providing the department mnemonic contains at least three characters. All department mnemonics in this program contain four characters. For departments which do not have assigned mnemonics, the merchandise entry mnemonic, MDS, will print.

Location 375, Sector "2," specifies location 130 as the starting address of the department table. The department table ends in location 373. Each table entry which specifies a department mnemonic consists of four characters. Table entries which do not specify a mnemonic consist of only three characters.

In Sector "1" the basic mnemonics occupy locations 000 through 154. Locations 155 through 204 are not used. A cassette label is programmed in locations 205 through 216. Locations 220 through 227 are not used.

Location 230, Sector "1," is programmed 00001000 which specifies a print column address of 8 for the total mnemonic during an inquiry transaction.

Location 231, Sector "1," is programmed 00001000 which specifies a print column address of 8 for the total number during a closing transaction. Bit 8 being reset (0) causes the total number to be left justified to this address.

This program utilizes all of the 47 totals available in the IDT terminal. The following table lists the total numbers, associated department numbers, and the assigned department mnemonics.

Total	Dept.	Mnemonic
1	1	COAT
2	2	SHOE
3	3	AUTO
4	4	ELEC
5	5	HDWR
6	6	LDYS
7	7	MENS
8	8	JWLY
9	9	SUIT
10	10	SPRT
11	10-19	DRUG
12	20-29	COSM
13	30-39	MISC
14	40-49	BKRY
15	50-59	HATS
16	60-69	LAWN
17	70-79	TOYS
18	80-89	BOOK
19	90-99	APPL
20	100-109	WIGS
21	100-199	CNDY
22	200-299	FURN
23	300-399	MDS
24	400-499	MDS
25	500-599	MDS
26	600-609	MDS
27	610-619	MDS
28	620-629	MDS
29	630-639	MDS
30	640-649	MDS
31	650-659	MDS
32	660-669	MDS
33	670-679	MDS
34	680-689	MDS
35	690-699	MDS
36	700	MDS
37	701	MDS
38	702	MDS
39	703	MDS
40	704	MDS
41	705	MDS
42	706	MDS
43	707	MDS
44	708	MDS
45	709	MDS
46	700-799	MDS
47	900-999	MDS

TRANSACTION TYPE MNEMONICS
SECTOR "0"

000/017	050/145	120/104	170/000
001/074	051/377	121/200	171/022
002/023	052/065	122/007	172/000
003/105	053/063	123/014	173/200
004/025	054/002	124/014	174/307
005/166	055/006	125/300	175/000
006/101	056/073	126/077	176/001
007/000	057/145	127/330	177/111
010/023	060/215	130/363	200/124
011/102	061/065	131/363	201/000
012/004	062/074	132/000	202/000
013/022	063/145	133/000	203/003
014/103	064/033	134/000	204/063
015/007	065/065	135/000	205/002
016/030	066/044	136/077	206/200
017/265	067/003	137/330	207/012
020/377	070/010	140/363	210/033
021/015	071/144	141/363	211/004
022/043	072/043	142/100	212/270
023/315	073/076	143/252	
024/053	074/041	144/021	
025/071	075/000	145/021	
026/072	076/204	146/042	
027/073	077/045	147/021	
030/074	100/156	150/042	
031/065	101/010	151/021	
032/000	102/042	152/042	
033/061	103/317	153/021	
034/071	104/051	154/042	
035/105	105/043	155/021	
036/003	106/016	156/042	
037/066	107/011	157/021	
040/071	110/020	160/042	
041/143	111/053	161/021	
042/215	112/066	162/000	
043/024	113/307	163/001	
044/062	114/320	164/001	
045/002	115/000	165/000	
046/006	116/000	166/120	
047/072	117/270	167/020	

TRANSACTION TYPE MNEMONICS
SECTOR "1"

000/115	050/110	120/104	170/000
001/104	051/307	121/111	171/000
002/323	052/103	122/101	172/000
003/122	053/123	123/107	173/000
004/124	054/310	124/240	174/000
005/316	055/103	125/103	175/000
006/105	056/117	126/124	176/000
007/122	057/304	127/304	177/000
010/322	060/114	130/057	200/000
011/123	061/127	131/057	201/000
012/124	062/331	132/257	202/000
013/314	063/126	133/116	203/000
014/104	064/117	134/124	204/000
015/111	065/304	135/240	205/000
016/323	066/122	136/104	206/000
017/106	067/117	137/320	207/124
020/105	070/301	140/122	210/117
021/305	071/103	141/124	211/115
022/115	072/123	142/057	212/040
023/123	073/310	143/105	213/114
024/303	074/122	144/330	214/101
025/104	075/123	145/116	215/123
026/105	076/324	146/057	216/123
027/320	077/103	147/123	217/207
030/124	100/123	150/314	220/000
031/101	101/255	151/116	221/000
032/330	102/122	152/057	222/000
033/124	103/124	153/115	223/000
034/124	104/316	154/304	224/000
035/314	105/123	155/000	225/000
036/103	106/114	156/000	226/000
037/122	107/305	157/000	227/000
040/324	110/103	160/000	230/012
041/101	111/116	161/000	231/012
042/124	112/324	162/000	232/355
043/304	113/126	163/000	
044/103	114/117	164/000	
045/104	115/111	165/000	
046/326	116/104	166/000	
047/103	117/240	167/000	

TRANSACTION TYPE MNEMONICS
SECTOR "2"

000/103	070/122	160/040	250/101	340/000
001/110	071/324	161/105	251/125	341/024
002/307	072/103	162/330	252/324	342/216
003/103	073/107	163/102	253/000	343/250
004/123	074/040	164/040	254/000	344/000
005/310	075/122	165/103	255/001	345/025
006/103	076/324	166/040	256/201	346/217
007/123	077/103	167/105	257/225	347/225
010/310	100/107	170/330	260/000	350/000
011/103	101/040	171/240	261/002	351/026
012/110	102/122	172/240	262/202	352/220
013/307	103/324	173/103	263/230	353/230
014/103	104/103	174/123	264/000	354/000
015/110	105/107	175/040	165/003	355/027
016/307	106/040	176/117	266/203	356/221
017/103	107/122	177/320	267/233	357/233
020/110	110/324	200/103	270/000	360/000
021/307	111/240	201/114	271/004	361/030
022/102	112/240	202/040	272/204	362/222
023/116	113/102	203/117	273/236	363/236
024/113	114/040	204/320	274/000	364/000
025/040	115/103	205/103	275/005	365/031
026/103	116/040	206/114	276/205	366/223
027/307	117/122	207/117	277/242	367/242
030/102	120/324	210/323	300/000	370/000
031/116	121/102	211/122	301/006	371/040
032/113	122/040	212/105	302/206	372/224
033/040	123/103	213/116	303/245	373/245
034/103	124/040	214/324	304/000	374/011
035/307	125/122	215/104	305/007	375/254
036/103	126/324	216/105	306/207	376/034
037/117	127/103	217/120	307/250	
040/304	130/123	220/324	310/000	
041/114	131/040	221/120	311/010	
042/131	132/105	222/122	312/210	
043/127	133/330	223/117	313/225	
044/331	134/103	224/307	314/000	
045/116	135/107	225/115	315/011	
046/117	136/040	226/105	316/211	
047/040	137/105	227/316	317/230	
050/123	140/330	230/124	320/000	
051/114	141/103	231/326	321/020	
052/305	142/107	232/240	322/212	
053/126	143/040	233/114	323/233	
054/117	144/105	234/104	324/000	
055/111	145/330	235/331	325/021	
056/304	146/103	236/115	326/213	
057/122	147/107	237/123	327/236	
060/117	150/040	240/303	330/000	
061/301	151/105	241/000	331/022	
062/240	152/330	242/104	332/214	
063/240	153/240	243/105	333/242	
064/240	154/240	244/314	334/000	
065/103	155/102	245/106	335/023	
066/123	156/040	246/125	336/215	
067/040	157/103	247/322	337/245	

TRANSACTION TYPE MNEMONICS
SAMPLE PRINTOUTS

```
449/0          280    333      55

1   01 001       1.00          .01 MEN
2   02 002       1.00          .02 TV
3   03 003       1.00          .03 LDY
4   04 004       1.00          .04 MSC
5   05 005       1.00          .05 DEL
6   06 006       1.00          .06 FUR
7   07 007       1.00          .07 AUT
8   08 008       1.00          .08 MEN
9   09 009       1.00          .09 TV
10  10 010       1.00          .10 LDY
11  11 011       1.00          .11 MSC
12  12 012       1.00          .12 DEL
13  13 013       1.00          .13 FUR
14  14 014       1.00          .14 AUT
15  15 015       1.00          .15 MEN
16  16 016       1.00          .16 TV
17  17 017       1.00          .17 LDY
18  18 018       1.00          .18 MSC
19  19 019       1.00          .19 DEL
20  20 020       1.00          .20 FUR
                                2.10 STL
                   12.00        .25 TAX
                                2.35 ATD
                                .00 CDU

5/17/74  1 CSH                  2.35 TTL
```

```
452/0          280    333      55

RST
                5 TAX           .25
                8 CSH 1        2.35
                16 N/SL        2.35
                17 N/MD        2.10
                               2.35 CSH
                               2.35 SLE
                                .00 RTN
///

5/17/74  44 CLOS                .00 TTL
```

450/0	280	333	55	
			.00	STL
	DP 1		.01	
	DP 2		.02	
	DP 3		.03	
	DP 4		.04	
	DP 5		.05	
	DP 6		.06	
	DP 7		.07	
	DP 8		.08	
	DP 9		.09	
	DP 10		.10	
	DP 11		.11	
	DP 12		.12	
	DP 13		.13	
	DP 14		.14	
	DP 15		.15	
	DP 16		.16	
	DP 17		.17	
	DP 18		.18	
	DP 19		.19	
	DP 20		.20	
5/17/74	46 DEPT		.00	TTL

TRANSACTION TYPE MNEMONICS ANALYSIS

This program replaces the basic transaction type mnemonics in Sector "1" with those programmed in Sector "2." The basic transaction mnemonics are programmed out by not including the transaction type field in the header or footer print control tables. Locations 114-116, Sector "0," (footer print control table) are programmed to include only the date field in the footer. The print column address for the date field is programmed to be 0.

Transaction type mnemonics are programmed in Sector "2" starting at location 000 and ending in location 224. Location 374, Sector "2," is programmed 00001001. This provides a print column address of 9 for the transaction type menmonics and specifies that the mnemonic is to be printed in the footer.

Department mnemonics are programmed in Sector "2" in locations 225-252. Location 210, Sector "0," is programmed to specify a print column address of 27 for the department mnemonics. Location 211, Sector "0," has bit 4 reset (0) to cause the department mnemonic to print on the same line as the item information. Location 064, Sector "0," specifies a print column address of 27 for the merchandise entry mnemonic. The merchandise entry mnemonic is programmed in locations 000-002, Sector "1," to be MDS. Therefore, both MDS and the department mnemonics are programmed to print left justified to column 27. However, the department mnemonic is loaded into the printer buffer after the merchandise entry mnemonic and will cancel the MDS providing all department mnemonics contain three characters. The department mnemonics programmed in locations 225-252, Sector "2," all contain three characters including the mnemonic TV which has a "space" for the third character.

Location 375, Sector "2," specifies location 254 as the starting address of the department table. The department table ends in location 373. Department numbers 1 through 20 are programmed legal. The total numbers are programmed to be the same as the department numbers.

In Sector "1" the basic mnemonics occupy locations 000 through 154. Locations 155 through 206 are not used. A cassette label is programmed in locations 207 through 216. Locations 220 through 227 are not used.

Location 230, Sector "1," is programmed 00001010 which specifies a print column address of 10 for the total mnemonic during an inquiry transaction.

Location 231, Sector "1," is programmed 00001010 which specifies a print column address of 10 for the total number during a closing transaction. Bit 8 being reset (0) causes the total number to be left justified to this address.

EXPANDED DEPARTMENT MNEMONICS SECTOR "0"

000/017	050/145	120/104	170/000
001/074	051/377	121/200	171/022
002/023	052/065	122/007	172/000
003/105	053/063	123/014	173/200
004/025	054/002	124/014	174/307
005/166	055/006	125/300	175/000
006/101	056/073	126/077	176/001
007/000	057/145	127/330	177/111
010/023	060/215	130/363	200/124
011/102	061/065	131/363	201/000
012/004	062/074	132/000	202/000
013/022	063/145	133/000	203/003
014/103	064/033	134/000	204/063
015/007	065/065	135/000	205/002
016/030	066/044	136/077	206/200
017/265	067/003	137/330	207/012
020/377	070/010	140/363	210/000
021/015	071/144	141/363	211/014
022/043	072/043	142/100	212/175
023/315	073/076	143/252	
024/053	074/041	144/021	
025/071	075/000	145/021	
026/072	076/204	146/042	
027/073	077/045	147/021	
030/074	100/156	150/042	
031/065	101/010	151/021	
032/000	102/042	152/042	
033/061	103/317	153/021	
034/071	104/051	154/042	
035/105	105/043	155/021	
036/003	106/016	156/042	
037/066	107/011	157/021	
040/071	110/020	160/042	
041/143	111/053	161/021	
042/215	112/068	162/000	
043/024	113/307	163/001	
044/062	114/120	164/001	
045/002	115/352	165/000	
046/006	116/000	166/120	
047/072	117/270	167/020	

EXPANDED DEPARTMENT MNEMONICS SECTOR "1"

000/115	050/110	120/104	170/317
001/104	051/307	121/111	171/103
002/323	052/103	122/101	172/117
003/122	053/123	123/107	173/123
004/124	054/310	124/240	174/115
005/316	055/103	125/103	175/105
006/105	056/117	126/124	176/124
007/122	057/304	127/304	177/111
010/322	060/114	130/057	200/303
011/123	061/127	131/057	201/107
012/124	062/331	132/257	202/114
013/314	063/126	133/116	203/101
014/104	064/117	134/124	204/123
015/111	065/304	135/240	205/323
016/323	066/122	136/104	206/110
017/106	067/117	137/320	207/101
020/105	070/301	140/122	210/122
021/305	071/103	141/124	211/304
022/115	072/123	142/057	212/110
023/123	073/310	143/105	213/117
024/303	074/122	144/330	214/125
025/104	075/123	145/116	215/123
026/105	076/324	146/057	216/305
027/320	077/103	147/123	217/125
030/124	100/123	150/314	220/116
031/101	101/255	151/116	221/104
032/330	102/122	152/057	222/105
033/124	103/124	153/115	223/322
034/124	104/316	154/304	224/123
035/314	105/123	155/127	225/127
036/103	106/114	156/101	226/111
037/122	107/305	157/122	227/315
040/324	110/103	160/305	230/012
041/101	111/116	161/127	231/012
042/124	112/324	162/105	232/113
043/304	113/126	163/101	
044/103	114/117	164/322	
045/104	115/111	165/101	
046/325	116/104	166/125	
047/103	117/240	167/124	

EXPANDED DEPARTMENT MNEMONICS
SECTOR "2"

000/103	070/103	160/117	250/000	340/006
001/117	071/110	161/000	251/027	341/206
002/101	072/117	162/050	252/221	342/110
003/324	073/117	163/234	253/102	343/107
004/123	074/314	164/101	254/121	344/000
005/114	075/123	165/117	255/000	345/005
006/101	076/110	166/000	256/026	346/205
007/103	077/117	167/047	257/220	347/352
010/113	100/105	170/233	260/105	350/244
011/323	101/323	171/116	261/121	351/000
012/123	102/117	172/121	262/000	352/004
013/111	103/106	173/000	263/025	353/204
014/114	104/106	174/046	264/217	354/350
015/126	105/111	175/232	265/105	355/243
016/105	106/103	176/353	266/120	356/000
017/322	107/305	177/016	267/000	357/003
020/123	110/123	200/000	270/024	360/203
021/120	111/125	201/045	271/216	361/345
022/117	112/111	202/231	272/104	362/107
023/122	113/324	203/115	273/244	363/000
024/324	114/303	204/110	274/000	364/002
025/107	115/314	205/000	275/023	365/202
026/114	116/315	206/044	276/215	366/347
027/117	117/000	207/230	277/104	367/243
030/126	120/000	210/011	300/001	370/000
031/105	121/000	211/000	301/000	371/001
032/323	122/000	212/043	302/022	372/201
033/127	123/000	213/227	303/214	373/246
034/101	124/064	214/114	304/351	374/377
035/124	125/242	215/120	305/243	375/123
036/103	126/111	216/000	306/000	376/363
037/110	127/120	217/042	307/021	
040/105	130/000	220/226	310/213	
041/323	131/063	221/114	311/106	
042/123	132/241	222/121	312/121	
043/125	133/114	223/000	313/000	
044/120	134/117	224/041	314/020	
045/114	135/000	225/225	315/212	
046/323	136/062	226/112	316/106	
047/120	137/240	227/121	317/120	
050/117	140/112	230/000	320/000	
051/117	141/117	231/040	321/011	
052/314	142/000	232/224	322/211	
053/112	143/061	233/112	323/103	
054/105	144/237	234/120	324/243	
055/127	145/102	235/000	325/000	
056/105	146/117	236/031	326/010	
057/114	147/000	237/223	327/210	
060/122	150/060	240/113	330/101	
061/331	151/236	241/000	331/121	
062/102	152/105	242/110	332/000	
063/117	153/117	243/000	333/007	
064/117	154/000	244/030	334/207	
065/124	155/061	245/222	335/101	
066/323	156/235	246/102	336/120	
067/123	157/106	247/120	337/000	

EXPANDED DEPARTMENT MNEMONICS
SAMPLE PRINTOUTS

```
382/0        280    333     55

1   01 001      1.00          MDS
COSMETIC                   .01
2   02 002      1.00          MDS
GLASSWARE                  .02
3   03 003      1.00          MDS
AUTO/SUPLS                 .03
4   04 004      1.00          MDS
HARDWARE                   .04
5   05 005      1.00          MDS
UNDERWEAR                  .05
6   06 006      1.00          MDS
POOL/SUPLS                 .06
7   07 007      1.00          MDS
COAT/L                     .07
8   08 008      1.00          MDS
COAT/M                     .08
9   09 009      1.00          MDS
SILVERWARE                 .09
10  10 010      1.00          MDS
WATCHES/L                  .10
11  11 011      1.00          MDS
WATCHES/M                  .11
12  12 012      1.00          MDS
HOUSEWARE                  .12
13  13 013      1.00          MDS
SPORTCOAT                  .13
14  14 014      1.00          MDS
SPORTWEAR                  .14
15  15 015      1.00          MDS
GLOVES/L                   .15
16  16 016      1.00          MDS
GLOVES/M                   .16
17  17 017      1.00          MDS
SLACKS/M                   .17
18  18 018      1.00          MDS
SLACKS/L                   .18
19  19 019      1.00          MDS
SCHOOL/POOL                .19
20  20 020      1.00          MDS
BOOTS/L                    .20
21  21 021      1.00          MDS
BOOTS/M                    .21
22  22 022      1.00          MDS
SHOES/M                    .22
23  23 023      1.00          MDS
SHOES/L                    .23
```

```
24  24 024      1.00          MDS
JEWELRY                    .24
25  25 025      1.00          MDS
OFFICE/POOL                .25
26  26 026      1.00          MDS
SWIMSUIT                   .26
27  27 027      1.00          MDS
SUIT/M                     .27
28  28 028      1.00          MDS
COAT/C                     .28
29  29 029      1.00          MDS
WATCHES/C                  .29
30  30 030      1.00          MDS
GLOVES/C                   .30
31  31 031      1.00          MDS
SLACKS/C                   .31
32  32 032      1.00          MDS
BOOTS/C                    .32
33  33 033      1.00          MDS
SHOES/C                    .33
34  34 034      1.00          MDS
JEWELRY/L                  .34
                           5.95 STL
              12.00         .71 TAX
                           6.66 ATD
                            .00 CDU

5/17/74   1 CSH            6.66 TTL
```

```
398/3       280   333    555

                2          .20 CNT
                3          .75 CNT
                4         4.00 CNT
                5        25.00 CNT
                2        20.00 CNT
          1 DIS          36.59
          2 FEE         321.45
          3 MSC          33.65
          5 TAX         341.91
          6 CTD        1111.11
          7 DEP           3.69
          8 CSH 1       698.57
          9 CHG 1      2492.62
         15 RT/EX        39.82
         16 N/SL       3191.19
         17 N/MD       2561.48
                        702.26 CSH
                       3227.77 SLE
                         36.58 RTN
///

5/17/74   44             49.95 TTL
```

```
387/0       280   333    55

                            .00 STL
          DP 1              .01
          DP 2              .02
          DP 3              .03
          DP 4              .04
          DP 5              .05
          DP 6              .06
          DP 7              .07
          DP 8              .08
          DP 9              .09
          DP 10             .10
          DP 11             .11
          DP 12             .12
          DP 13             .13
          DP 14             .14
          DP 15             .15
          DP 16             .16
          DP 17             .17
          DP 18             .18
          DP 19             .19
          DP 20             .20
          DP 21             .21
          DP 22             .22
          DP 23             .23
          DP 24             .24
          DP 25             .25
          DP 26             .26
          DP 27             .27
          DP 28             .28
          DP 29             .29
          DP 30             .30
          DP 31             .31
          DP 32             .32
          DP 33             .33
          DP 34             .34

5/17/74   46                .00 TTL
```

EXPANDED DEPARTMENT MNEMONICS ANALYSIS

This program uses expanded department mnemonics programmed in both Sectors "1" and "2." In Sector "1," the expanded department mnemonics start in location 155, immediately following the basic mnemonics, and end in location 227. A cassette label is not required in this program. In Sector "2," the expanded department mnemonics start in location 000 and end in location 116.

Location 374, Sector "2," is programmed 377 octal. This programs out transaction type mnemonics and indicates the presence of expanded department mnemonics.

The print column address for the expanded department mnemonics is 0 as specified in location 210, Sector "0." Location 211, Sector "0," has bit 4 set (1) which causes the expanded department mnemonic and price to be printed on the line following the item information.

The department table starts in location 123, Sector "2," and ends in location 373. Department numbers 1 through 34 are programmed legal. The total numbers are programmed to be the same as the department numbers.

Location 230, Sector "1," is programmed 00001010 which specifies a print column address of 10 for the total mnemonic during an inquiry transaction.

Location 231, Sector "1," is programmed 00001010 which specifies a print column address of 10 for the total number during a closing transaction. Bit 8 being reset (0) causes the total number to be left justified to this address.

SECTION F
RESIDENT DIAGNOSTIC DESCRIPTION

INTRODUCTION

The TCU firmware provides a resident diagnostic which may be accessed only by a Technical Service Representative since the cabinet must be removed to initiate the diagnostic mode. The diagnostic routines may be exercised by the Technical Service Representative to aid in isolating malfunctions to the module level. The diagnostic routines provide the following.

- Automatically recycling TCU test.
- Automatic entry to programming mode, programming key not required.
- Ability to perform test transactions without altering permanent totals or counters.
- Automatic recycling of the printer.
- Recycling communications test with the 723 without data being recorded on tape. Recycling communications test with the 761 with the option of recording data on a diagnostic tape.

The 280 diagnostic mode flow is depicted in figure F-1.

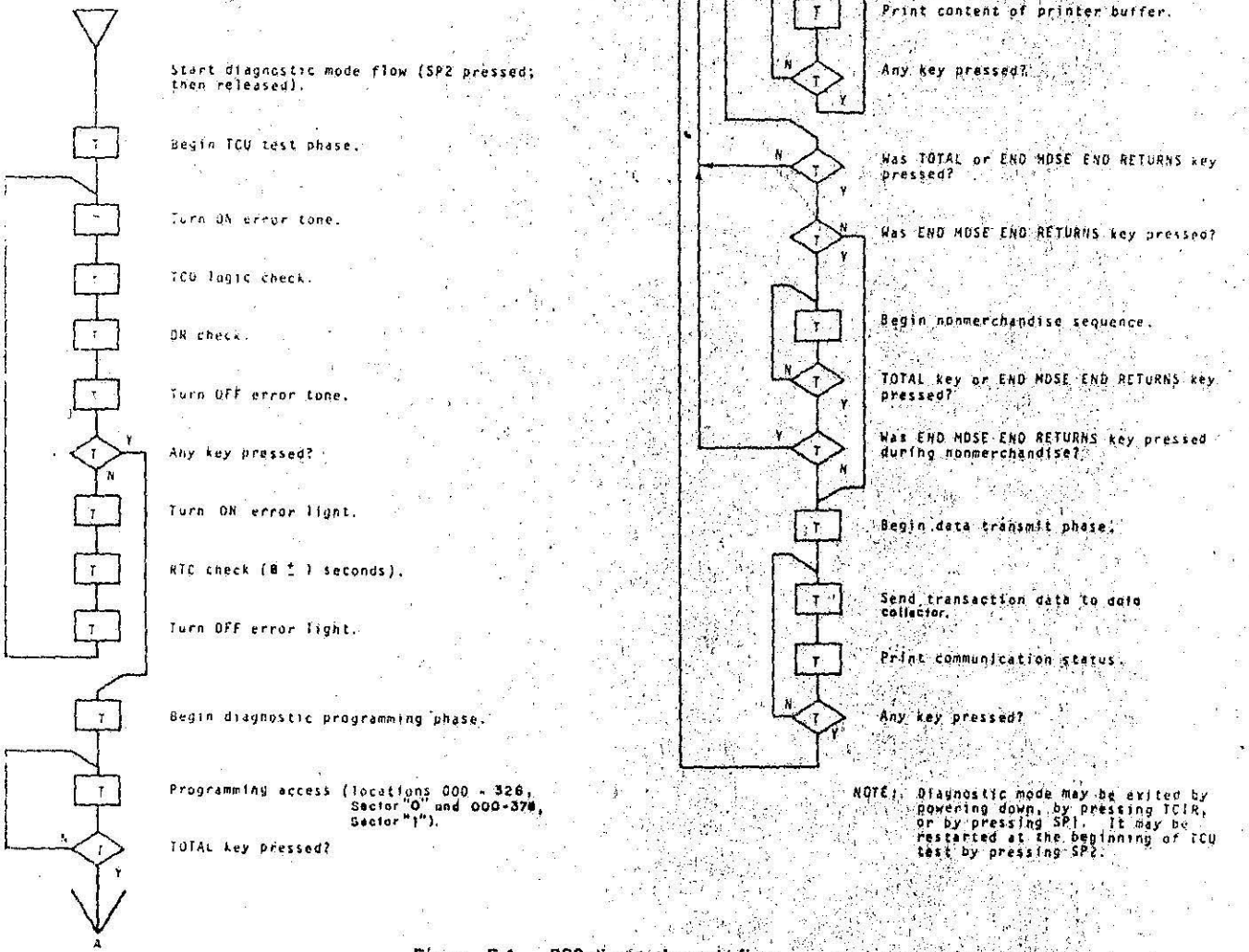

Start diagnostic mode flow (SP2 pressed; then released).
Begin TCU test phase.
Turn ON error tone.
TCU logic check.
DR check.
Turn OFF error tone.
Any key pressed?
Turn ON error light.
RTC check (0 ±) seconds).
Turn OFF error light.
Begin diagnostic programming phase.
Programming access (locations 000 - 326, Sector "0" and 000-378, Sector "1").
TOTAL key pressed?
A
Calculate core check digit for both sectors.
Store check digits.
Begin test transaction phase.
Enter desired qualification code.
Begin merchandise sequence.
Was X key pressed at 1st merchandise data entry point followed by pressing of SUBTOTAL key?
Enter data for repeat print cycle.
Print content of printer buffer.
Any key pressed?
Was TOTAL or END MDSE END RETURNS key pressed?
Was END MDSE END RETURNS key pressed?
Begin nonmerchandise sequence.
TOTAL key or END MDSE END RETURNS key pressed?
Was END MDSE END RETURNS key pressed during nonmerchandise?
Begin data transmit phase.
Send transaction data to data collector.
Print communication status.
Any key pressed?
NOTE: Diagnostic mode may be exited by powering down, by pressing TCIR, or by pressing SP1. It may be restarted at the beginning of TCU test by pressing SP2.

Figure F-1 280 diagnostic mode flow

ENTERING DIAGNOSTIC MODE

The Technical Service Representative enters the diagnostic mode by pressing switch SP2 on the TCU logic board. This sets the TCU program counter to address 001 (PC1) which contains an instruction that initiates a program branch to the diagnostic routine and sets the diagnostic flag as an indicator to the firmware. The 280 enters the TCU test portion of diagnostic mode when SP2 is released.

TCU TEST

The TCU test is performed automatically upon entering diagnostic mode. This test is made up of two segments; the TCU logic and data register (DR) check and the real time clock (RTC) check.

TCU LOGIC AND DR CHECK

The TCU logic and DR check segment of the diagnostic mode exercises all internal logic functions of the TCU except the common port interface logic (checked during test transaction). The DR check portion performs a read/write test of the data registers contained on the TCU memory board. The error tone is turned ON throughout the duration of the TCU logic and DR check. If an error occurs during this phase, the 280 hangs up with the error tone sounding which indicates a malfunction in the TCU module. If the TCU logic and DR check performs successfully, the error tone is silenced and the error light is illuminated indicating the beginning of the RTC check. Any key being pressed prior to the error light illuminating causes the diagnostic programming phase to be entered.

RTC CHECK

The RTC check portion of the diagnostic loads the RTC register with all ONE bits, then counts the RTC down by one each character time. When the RTC has counted down to zero, the error light turns OFF after having been on approximately 8 seconds. If the error light is ON for a noticeably short or long duration, a malfunction exists in the TCU module. At the completion of the RTC check, the error tone is turned ON and the TCU logic and DR check is repeated.

DIAGNOSTIC PROGRAMMING

The diagnostic programming phase is entered if any key is pressed during the TCU test. The operation of programming sequences in diagnostic is the same as in normal programming with the exception being that the Technical Service Representative may access locations 000 through 326, Sector "0" and 000 through 376, Sector "1". The TOTAL key is pressed to exit from diagnostic programming. Upon exit from diagnostic programming, core check digits are calculated and stored in both sectors.

TEST TRANSACTION

The test transaction phase of diagnostic is entered immediately after exiting diagnostic programming. This phase permits the Technical Service Representative to perform all transactions that are normally available to an operator or programmer. The media count, transaction count, and totals are not incremented during a test transaction. By performing the test transactions, the Technical Service Representative may determine malfunctions in the firmware and those malfunctions associated with a particular module or unit. In addition to being able to perform transactions, this phase enables the Technical Service Representative to exercise the printer through a repeating print cycle and the communications modules through a repeating data transmit sequence.

When operating in the test transaction phase of diagnostic, the Technical Service Representative must follow the same data input criteria relative to CDV checked areas and maximum field sizes as the operator. While in the test transaction phase, the programming mode may be entered in the normal manner with the program key. Core locations accessible are the same as in diagnostic programming.

NOTE 1: Data is not written on tape at the 723 during any phase of the diagnostic operation. Data may be written on tape at the 761.

NOTE 2: Re-entry mode should not be used during diagnostic, since this mode causes the diagnostic flag to reset and user mode to be entered.

REPEAT PRINT CYCLE

An automatically repeating printer test may be performed during the test transaction phase of diagnostic. This repeat print cycle may be initiated by pressing the X key at the first merchandise data entry point and then pressing the SUBTOTAL key when the DATA descriptor is illuminated. At this point, load the print buffer with the data to be repeat printed. After loading the data, pressing the ENTER key starts the repeat print cycle. Once initiated, the repeat print cycle may be stopped by pressing any key on the keyboard. The terminal returns to the first merchandise data entry point when the repeat print cycle is stopped. When loading the print buffer, alpha characters may be loaded along with the numerics by pressing function keys. Following is a list of the alpha characters that may be printed during this test and the function keys used to load them.

Numeric keys load the same number as that of the key.

Function Key Pressed	Character Loaded
PRICE CHANGE	B
MODIFY TAX	A
/FOR	L
X	F
CLEAR	Space
ITEM CORRECT	M
TOTAL	G
END MDSE END RETURNS	N
SUBTOTAL	E
DECIMAL POINT OR 1/2 PENNY	H

DATA TRANSMIT WITH 723

Data transmission occurring at the end of a transaction is continually retransmitted until any key on the keyboard is pressed. When a key is pressed, the firmware branches to the qualification code entry point. During the transmission of data to the 723, an SO character is transferred as the first character of the data message instead of an FS which prevents data from being recorded on tape at the 723. At the end of each transmitted message, the 280 drops the communication line, times out 100 msec., and prints a code which indicates the status of the transmission. The status is

determined by one of the following codes.

Code	Status
0	Transmission OK
1	Transmission OK, 1 NAK received
2	Transmission OK, 2 NAK's received
3	Transmission aborted, 3 NAK's received
4	Transmission aborted, 3 ENQ's received
5	Transmission aborted, unexpected EOT received
6	Transmission aborted, loss of carrier
7	Unable to establish a communication line

The printing of these codes and a more detailed explanation of each is contained in the Data Collection section.

If the 280 has been operating in the online mode prior to entering diagnostics and a line cannot be established, the line establishment timer (4-60 seconds) times out, a 7NT code is printed, and the line establishment procedure is repeated until a line is established.

If the 280 has been operating offline due to failure to establish a communication line prior to entering diagnostic and the terminal has not been reset, no attempt is made to establish a communication line during diagnostic. A 7NT code is repeatedly printed and the line establishment timer does not time out.

DATA TRANSMIT WITH 761

When data collecting with a 761 and it is desired to record test transaction data on tape, the customer's tape must be removed and a new tape inserted. Use the following procedure to change tapes.

1. While still in the normal (nondiagnostic) mode, perform a closing transaction with a read and/or reset of totals. A "7-8" indication will then be displayed on the operator's display.
2. Press the "8" key. This terminates and rewinds the customer's tape.
3. Enter the diagnostic mode.
4. Press any key to enter diagnostic programming.
5. Press the TOTAL key to enter the test transaction phase of diagnostics.
6. Remove the customer's tape. Insert the diagnostic tape and perform desired test transactions.

When in the diagnostic mode, the tape placed in the 761 must be on beginning of clear leader (BCL). The tape is read for 39.4 inches to ensure that no data is present. If data is found the tape is rewound and the normal indication to change tape is given. If no data is found, the tape is erased for an additional 19.7 inches to ensure that the tape can be used for diagnostics. A label-FM is then written and the 761 is ready for online test transactions.

With a diagnostic tape present in the 761, all operations are normal except for the following.

1. The first file separator (FS) of a message is replaced by an ASCII SO character.
2. At the end of each transaction, the data will be written repeatedly until a key is pressed.
3. The terminal may be powered down and then powered up in the diagnostic mode without removing the diagnostic tape. If this is done, the "FM-Label-FM" will not be written and the tape will not be searched for data.
4. If the terminal is powered down and then powered up in the normal mode, the diagnostic tape will be rewound and a new customer's tape will be requested.
5. At the end of each transaction the 280 prints a code on the journal which indicates the status of the transmission. The codes are as follows.

Code	Reason
0	Wrote successfully first time
1	Wrote successfully first retry
2	Wrote successfully second retry
3	Cannot write in three attempts
6	761 in inoperative status
7	761 power off
8	Customer's tape present
9	Bad status

If writing on tape is not required during diagnostics, the customer's tape may remain in the 761. With the customer's tape in the 761, the terminal will react as follows when the diagnostics mode is entered.

1. Go off-line immediately.
2. Print an "8" for the off-line reason code.
3. The "transaction has been off-line" tone will not occur.
4. The COMM ALERT descriptor on the operator's display panel will light between transactions.
5. When powered down and then powered up in the normal mode, the terminal action will be the same as for a normal power turn-on.

EXITING DIAGNOSTICS

Once the test transaction phase of diagnostics has been entered, the 280 remains in that phase until one of the following actions is taken.

1. SP2 on the M15 TCU is pressed. This causes entry to the TCU test phase of the diagnostic.
2. SP1 on the M15 TCU is pressed. This causes the program counter to be reset to PC0, initiating the normal mode of operation.
3. SP1 (TCIR) on the M19 Terminal Clock is pressed. This causes the 280 to exit from the diagnostic mode.
4. The 280 is powered down. This causes the normal mode to be entered during the next upsequence.

DIAGNOSTIC TROUBLESHOOTING FLOW CHART

Figure F-2 indicates possible malfunctions which may be encountered during diagnostics and provides suggestions for isolation of the trouble.

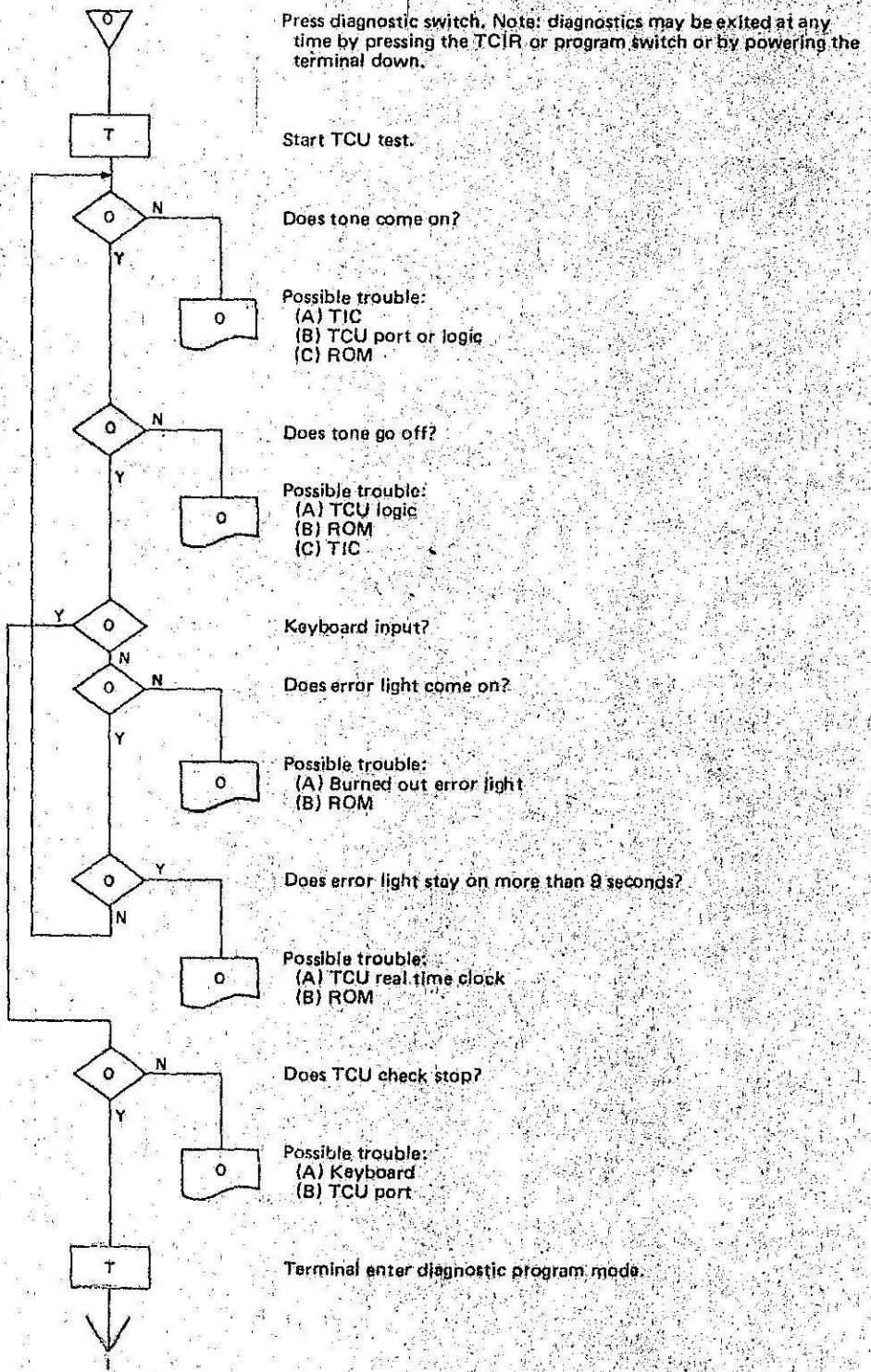


Figure F-2 Sample diagnostic decision chart (1 of 6)

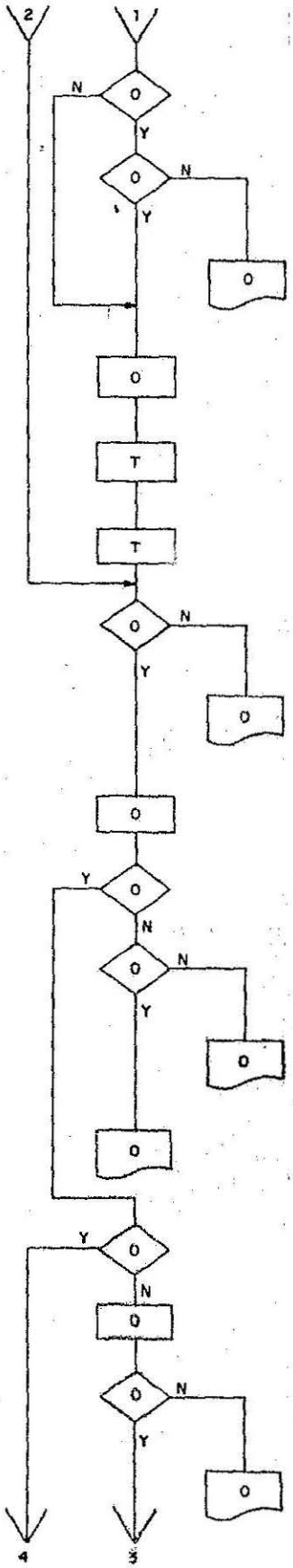


Figure F-2 Sample diagnostic decision chart (2 of 8)

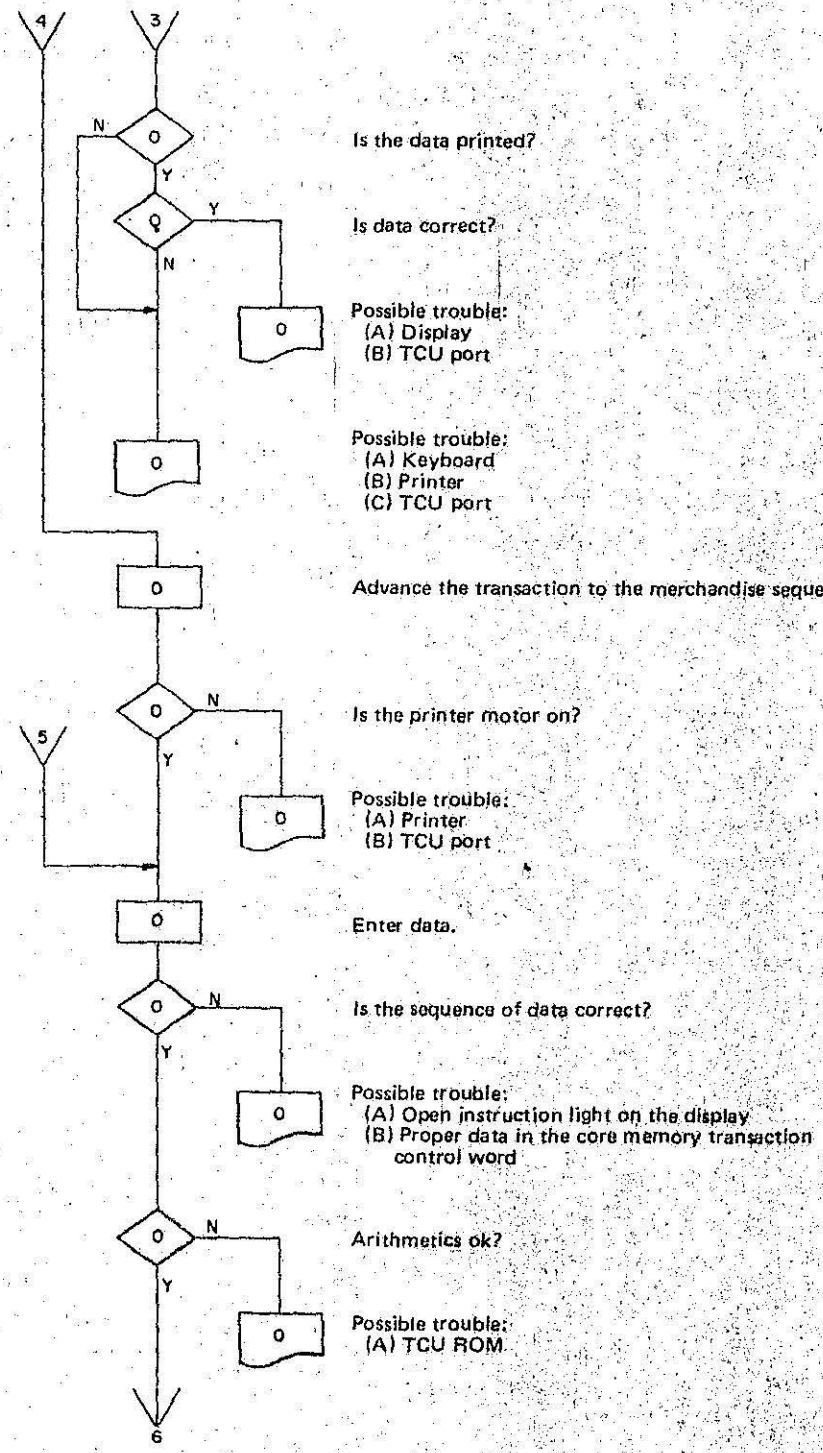
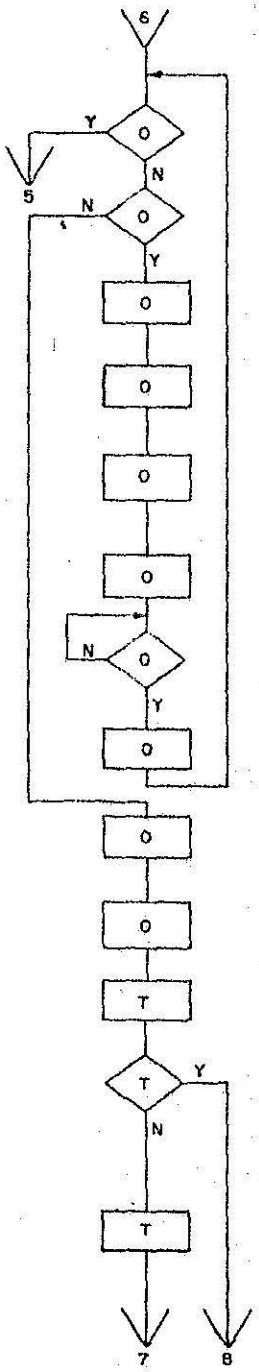


Figure F-2 Sample diagnostic decision chart (3 of 6)



Want to enter more data?

Want to repeat print?

Press X key.

Press SUBTOTAL key.

Enter data to be repeat printed (up to 30 digits).

Press ENTER key.

Want to stop the printer?

Press ENTER key.

Press TOTAL key.

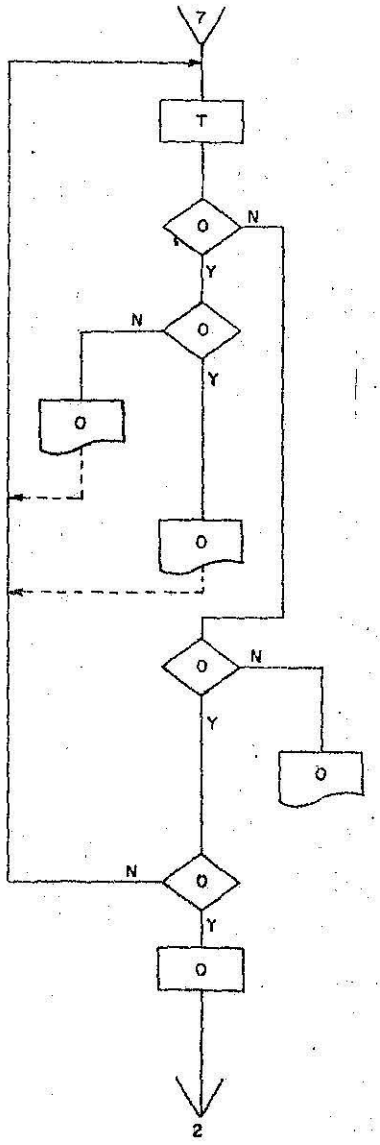
Complete transaction checking data entry sequence arithmetics, sequence, data error checks, etc.

Prints programmed diagnostic mnemonics on all media.

Cassette data collection?

Enter the 723 communication test.

Figure F-2 Sample diagnostic decision chart (4 of 6)



Communicate, if not offline, and initiate printer.

Has a 7NT been printed on the journal? (If terminal was not offline prior to entering diagnostics, a time out will occur on every transmission attempt.)

Is the data collector in the data collect mode?

Possible trouble:
(A) Data collector offline

Possible trouble:
(A) Modem or TCA
(B) Communication lines
(C) TCU port

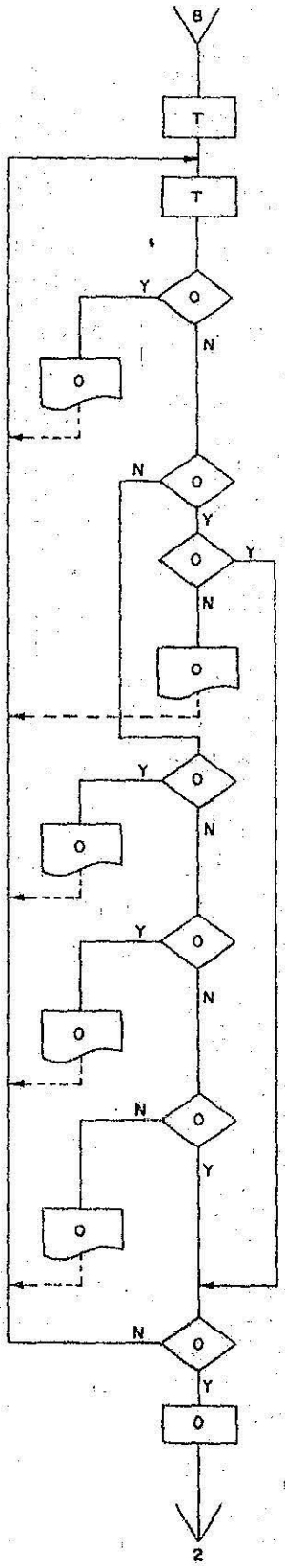
Has a 0 code been printed?

Possible trouble:
(A) Modem or TCA
(B) Data collector if all terminals showing same response

Want to end communication test?

Press any key.

Figure F-2 Sample diagnostic decision chart (5 of 6)



Enter the 761 communication test.

Communicate, if not offline, and initiate printer. Offline reason code will not change if terminal had been offline before entering diagnostics.

Has a 9 been printed?

Possible trouble:
(A) TCU port
(B) CTR malfunction

Has an 8 code been printed?

Customer tape or no cassette on port?

Possible trouble:
(A) TCU port
(B) CTR malfunction
(C) Remote cable

Has a 7 code been printed?

Possible trouble:
(A) Power off on CTR

Has a 6 code been printed?

Possible trouble:
(A) Cassette sensing switches

Has a 0 code been printed?

Possible trouble:
(A) Tape
(B) Recording head
(C) Recording head alignment

End communication?

Depress any key.

Figure F-2 Sample diagnostic decision chart (6 of 6)

COMMON PORT INTERFACE DESCRIPTION

The TCU transfers information to and from the modules and units in the 280 via the common port interface. This interface is contained on the TCU logic board along with the processing logic. The common port interface is controlled by the processing logic and the program instructions. The TCU outputs information to all modules and units connected to its common port interface simultaneously and selects only one module or unit to accept the information. The TCU receives input information from modules and units on individual lines assigned to each module port position.

The TCU common port interface is equipped to handle up to 16 module ports. In the 280 application, 16 module ports are available, but only 10 have modules or units assigned.

The common port interface is depicted in the block diagram of figure G-1. As shown in figure G-1, the 410 Coin Dispenser requires a 710-1 interface to enable communications with the 280 TCU.

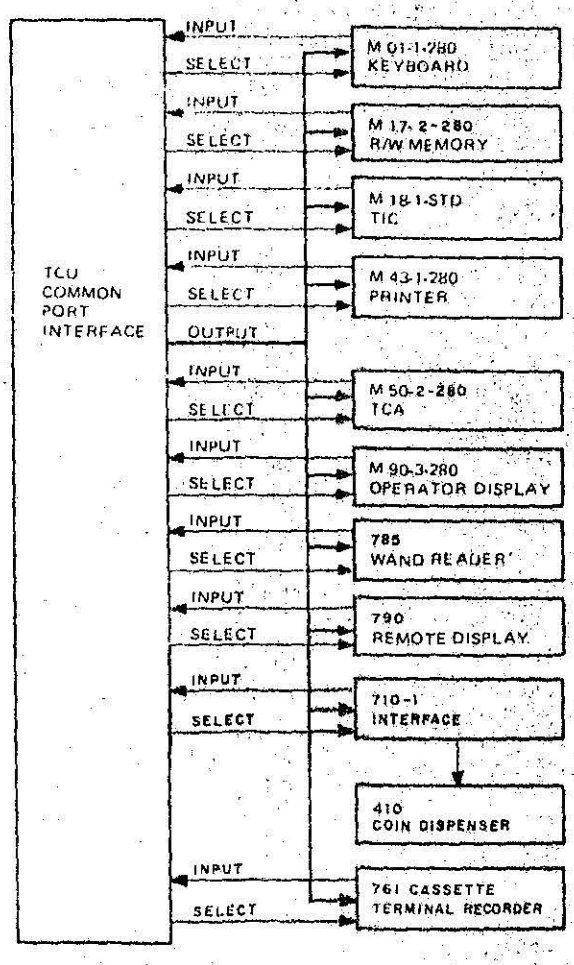


Figure G-1 Common port interface block diagram

PORT ASSIGNMENTS

The modules and units assigned to the common port in the 280 application are listed in table G-1.

Table G-1 Port assignments

PORT NUMBER	MODULE OR UNIT ASSIGNED
0	M50-2-STD, TCA
1	M01-1-280, Keyboard
2	M90-3-280, Operator display
3	M17-2-STD, Read/write memory
4	M43-1-280, Helical printer
5	M18-1-STD, TIC
6-9	Not assigned
10	790 Remote display
11	785 Wand reader
12	710-1 Interface for 410 Coin dispenser
13	Not assigned
14	761 Cassette terminal recorder
15	Not Assigned

The connector locations for the remote cables entering the 280 at the remote connector box are identified in figure G-2. Access to the 280 remote connectors is gained by removing the connector box from the bottom of the 280 (one screw) and removing the bracket (four Allen screws).

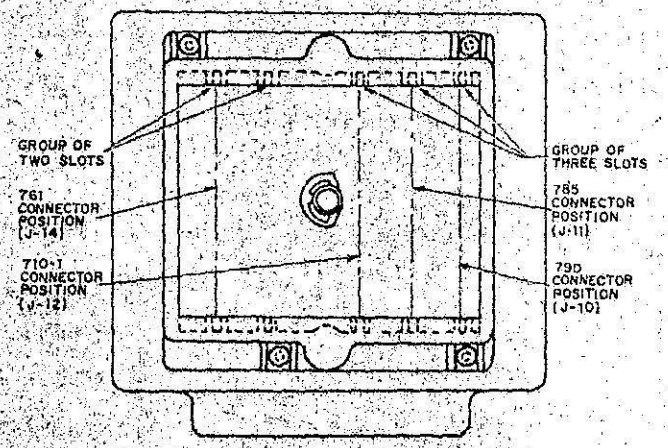

GROUP OF TWO SLOTS
761 CONNECTOR POSITION (J-14)
710-1 CONNECTOR POSITION (J-12)
GROUP OF THREE SLOTS
785 CONNECTOR POSITION (J-11)
790 CONNECTOR POSITION (J-10)

Figure G-2 280 remote connector box

COMMON PORT INTERFACE LINES

The common port interface communication is implemented through use of input, output, and select lines. The signal levels and data transferred on these lines are described in the *M15, Terminal Control Unit FSTM (MS-415).*

Input Lines
UDS0.3 through UDS15.3

Output Lines
TCDF.3A
TCDF.3B
TCFF.3A
TCFF.3B
TCTB8.3A
TCTB8.3B

Select Lines
TCS0.3 through TCS15.3

NOTE: Input and select lines assigned to a particular module port are designated by the line type followed by the port number. For example, the select line for the keyboard is TCS1.3.

CONNECTOR PIN ASSIGNMENTS

Figure G-3 depicts the pin assignments of the TCU connector, M15-P1, relative to the 280 application.

280 APPLICATION	LINES	PINS		LINES	280 APPLICATION
M 19	PH1.0A	1	2	PH1.JA	M 19
M 19	PH3.JA	3	4	PH3.0A	M 19
M 19	TCIR.J	5	6	TCT88.3A	PORTS 0-5
PORTS 0-5	TCDF.3A	7	8	TCFF.3A	PORTS 0-5
NA		9	10		NA
POWER SUPPLY	+12V	11	12		NA
POWER SUPPLY	-6.8V	13	14	-12V	POWER SUPPLY
POWER SUPPLY	GND	15	16		NA
NA		17	18		NA
PORTS 10-14	TCFF.3B	19	20		NA
PORTS 10-14	TCT88.3B	21	22	DTC1R.I	M 19
PORTS 10-14	TCDF.3B	23	24	UDS9.3	NA
790	UDS10.3	25	26	UDS8.3	NA
NA	UDS15.3	27	28	TCS11.3	785
761	UDS14.3	29	30	TCS10.3	790
NA	UDS13.3	31	32	TCS9.3	NA
710-1	UDS12.3	33	34	TCS8.3	NA
785	UDS11.3	35	36	UDF15.3	NA
NA	UDF13.3	37	38	UDF14.3	761
710-1	UDF12.3	39	40	TCS13.3	NA
785	UDF11.3	41	42	TCS12.3	710-1
790	UDF10.3	43	44	TCS14.3	761
NA	UDF9.3	45	46	TCS15.3	NA
NA	UDF8.3	47	48	TCS7.3	NA
NA	UDS6.3	49	50	TCS6.3	NA
M 43	UDS4.3	51	52	TCS5.3	M 18
M 90	UDS2.3	53	54	TCS4.3	M 43
M 01	UDS1.3	55	56	UDS5.3	M 18
M 50	UDS0.3	57	58	UDS7.3	NA
M 43	UDF4.3	59	60	UDS3.3	M 17
M 18	UDF5.3	61	62	TCS3.3	M 17
NA	UDF6.3	63	64	TCS2.3	M 90
NA	UDF7.3	65	66	TCS1.3	M 01
M 90	UDF2.3	67	68	UDF3.3	M 17
M 50	UDF0.3	69	70	TCS0.3	M 50
NA		71	72	UDF1.3	M 01

COMPONENT SIDE OF BOARD

NA NOT ASSIGNED

Figure G-3 M15-P1 connector pin assignment

761 AND 410 INTERFACE DESCRIPTION

The following interface information for the 761 and 410 is intended to supplement the Domestic 280 TIM, MS-843. Manual MS-843 does not include 761 and 410 information.

Table G-2 761 function codes

FUNCTION	BITS							
	8	7	6	5	4	3	2	1
Write (WRT)	0	0	1	0	X	X	X	X
Read (RED)	0	0	1	1	X	X	X	X
Backspace (BSP)	0	1	0	0	X	X	X	X
Rewind (RWD)	0	1	0	1	X	X	X	X
Stop (STOP)	0	0	0	1	X	X	X	X
Erase (ERS)	0	1	1	0	X	X	X	X
Transfer data (MOV)	0	1	1	1	X	X	X	X
Write file mark (WTFM)	1	0	0	1	X	X	X	X

Table G-3 761 status codes

STATUS	BITS							
	8	7	6	5	4	3	2	1
Busy (BSY)	0	0	0	1	X	X	X	X
Beginning or end of tape (BET)	0	1	0	1	X	X	X	X
End of message (EOM)	1	0	0	1	X	X	X	X
Ready (RDY)	1	0	0	0	X	X	X	X
Idle (IDL)	0	1	0	0	X	X	X	X
Error (ERR)	0	1	1	1	X	X	X	X
Inoperative (INOP)	0	0	1	0	X	X	X	X
Power supply off (PWOF)	0	0	1	1	X	X	X	X
File mark detected (FLMK)	0	1	1	0	X	X	X	X

Table G-4 710-1 function codes

FUNCTION	BITS							
	8	7	6	5	4	3	2	1
Receive Data	0	0	0	1	X	X	X	X
Dispense Change	0	0	1	0	X	X	X	X

Table G-5 710-1 status codes

STATUS	BITS							
	8	7	6	5	4	3	2	1
Ready	0	0	1	0	X	X	X	X
Busy	0	0	0	1	X	X	X	X

INSTALLATION CHECKOUT PROCEDURE

Check the 280 and all remote units for visible damage. Remove the cash drawer and cabinet. Check to see that all printed circuit boards are properly seated in the connectors. Visually inspect the wiring harnesses to be certain there are no loose wires or bent pins.

Connect all remote units to the 280. Refer to figure G-2.

Connect the 280 to the AC power input and perform the following checks.

PH1.JB	1	2	PH1.QB
PH3.QB	3	4	PH3.JB
TCTB8.3B	5	6	TCIR.J
TCFF.3B	7	8	TCDF.3B
UDS14.3	9	10	UDF14.3
TCS14.3	11	12	+12 V
-12 V	13	14	-6.8 V
GND	15	16	GND.
	17	18	
	19	20	
	21	22	
	23	24	
	25	26	
	27	28	
	29	30	

Figure G-4 761 connector J14

PH1.JB	1	2	PH1.QB
PH3.QB	3	4	PH3.JB
TCTB8.3B	5	6	TCIR.J
TCFF.3B	7	8	TCDF.3B
UDS12.3	9	10	
TCS12.3	11	12	+12 V
-12 V	13	14	
GND.	15	16	GND.
	17	18	
	19	20	
	21	22	
	23	24	
	25	26	
	27	28	
	29	30	

Figure G-5 710-1 connector J12

1. Power up the 280. If an error occurs during upsequence, the read/write memory has probably lost some data during shipment and should be reloaded as necessary.

2. Enter diagnostic mode and perform sufficient transactions to ensure that the 280 and all remote units are operating properly.

3. Check the print quality in all print stations and perform the hammer adjustments if required. If adjustment is required, the print should be adjusted slightly heavy at the bottom of the character to compensate for typeline drift with machine warmup.

4. Check all indications on the operator display for proper operation.

5. Check cash drawer operation.

6. Check printline spacing in all print stations and adjust as required.

7. Check the operation of all switches and keylocks.

PREVENTIVE MAINTENANCE

The PM requirements for the 280 are based on the average work load per unit listed below. These averages are weighted according to the sales forecast of 70 percent department and 30 percent discount store application.

Transactions/day	523
Print lines/year	516,000
Operating hours/year	2,500
Key depressions/year	1,860,000

Major deviations from these averages should be reflected in the scheduling of PM.

Refer to the *Lubrication Information* subsection for the types of lubricants to be used on the 280.

The following preventive maintenance information does not include that required for the M43 printer. Refer to manual MS-443 for printer preventive maintenance.

PM REQUIRED EVERY 180 DAYS (6 MONTHS)

Remove the cabinet, cash drawer, journal cassette, and receipt paper roll.

Clean out all paper dust and dirt which may have accumulated.

Clean the windows of the operator display and qualification panel with a suitable cleaner (naptha).

Check the cabinet latches, drawer release solenoid, and cabinet locating studs for lubrication (lubricate only if required).

PM REQUIRED EVERY 360 DAYS (1 YEAR)

1. Upper cabinet

   Lubricate left door latch and pivot point.

2. Cash drawer

   Remove drawer from unit and clean, check, and lubricate the following.

   - Drawer release keylock and cam
   - Drawer release hooks
   - Cabinet locking latch arm
   - Drawer front cover plate stud
   - Drawer release levers
   - Drawer catch plate
   - Drawer release slide (i.d. only)

   After replacing the drawer, check the operation for freedom from binds and excess lateral movement. Adjust if required.

3. Base assembly

   Clean, check, and lubricate the following.

   - Keylocks and cams
   - Drawer slide plate and spring
   - Drawer guide rollers (i.d. only)
   - Drawer catch solenoid
   - Drawer closed sensing-switch slide and spring

LUBRICATION INFORMATION

The 280 Retail Terminal contains assemblies that require lubrication during normal preventive maintenance or when installing replacement parts. The following is a list of the recommended lubricants for use on the 280 and a list of the lubrication points.

LUBRICANTS REQUIRED

LUBRICANT	STOCK NO.
NCR Lubricant No. 801M (1)	6510801
NCR Lubricant No. 803M (3)	R8655

LUBRICATION POINTS

Cash Drawer and Cabinet	Lubricant
Arm, Cabinet Locking Latch (studs, sliding surfaces)	1
Boss, Right Door Torsion Spring (Working surface)	3
Cam, Lock (working surfaces)	1
Catch, Drawer (stud o.d., pivot point)	1
Hinges, Right and Left Door (pivot pins and spring working surfaces)	3
Hooks, Drawer Release (stud o.d., latching surface, pivot point)	1
Keylocks (one drop in each key hole)	3
Latch, Left Door (plunger and spring working surfaces, sparingly)	1
Levers, Drawer Release (pivot point, working surfaces)	1
Plate, Drawer Catch (latching surface)	1
Plate, Drawer Slide (sliding surfaces, spring hole)	3
Rollers, Drawer Guide (i.d., stud o.d.)	1
Rollers, Drawer Eccentric Guide (i.d., stud o.d.)	1
Slide, Drawer Release (working surface)	1
Solenoid, Drawer Catch (arm: pivot point, working surfaces)	1
Spring, Drawer Slide Plate (hooks)	1
Studs, Cabinet Locating (o.d.)	1
Stud, Drawer Front Cover Plate (o.d.)	1

ADJUSTMENTS

The following adjustment procedures do not include those required for the M43 printer. Refer to manual MS-443 for printer adjustments.

OPERATOR DISPLAY

This adjustment is necessary to ensure that the M90 operator display module does not interfere with the cabinet in the front or the printer module circuit boards in the rear.

To complete the adjustment, the following steps must be performed.

1. Loosen the four screws which attach the display module to the mounting brackets (two uppermost screws on the left and right sides of the module).
2. Move the display module to the front or the rear so that the front of the module is flush with the front of the mounting brackets. (A straightedge may be used to facilitate this adjustment.)
3. Tighten the four screws.

KEYBOARD TO KEYLOCKS

The purpose of this adjustment is to align the keyboard with the keylocks in order to ensure that they fit properly through the openings in the cabinet plastic front.

Loosen the two screws which attach the keylocks to their mounting bracket and adjust the keylocks so that dimension A is 2.519 inches ±.001 (63.98 mm ± .025) and dimension B is 0.876 inches ±.001 (22.25 mm ± .025). Tighten the two screws. Refer to figure G-6.

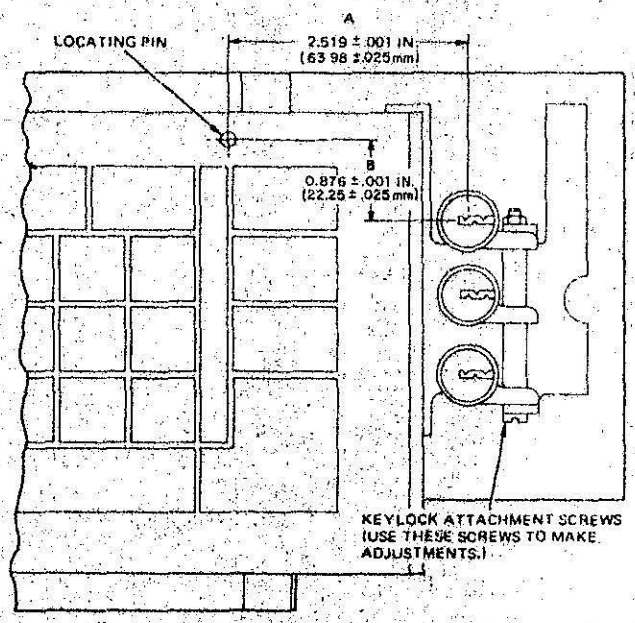


Figure G-6 Keyboard to keylocks adjustment

An alternate method of adjustment is to use the plastic front itself as a fixture to determine the proper location of the keylocks.

NOTE: Care must be taken when using this method to ensure that the keylocks are positioned so that it is not possible to actuate the switches by lateral keylock movement.

A soon to be released keylock mounting design change eliminates the need for this adjustment.

CASH DRAWER CATCH

The purpose of these adjustments is to ensure proper engagement and release of the cash drawer catch. Refer to figure G-7.

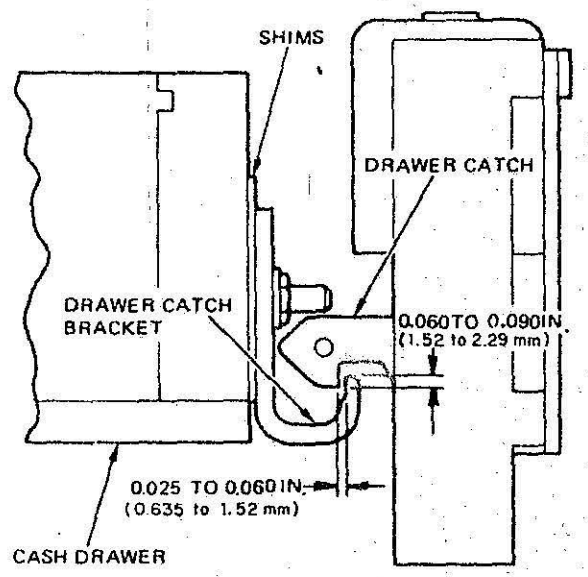


Figure G-7 Cash drawer catch adjustment

1. Install catch bracket shims behind the drawer catch bracket on the back of the cash drawer to obtain 0.025- to 0.060-inch (0,635 to 1.52 mm) clearance with the drawer catch when the rubber drawer stop is against the terminal base.

2. Adjust the drawer catch bracket up or down as needed so that the drawer catch overlaps the drawer catch bracket 0.060 to 0.090 inch (1.52 to 2.29 mm) when the cash drawer is latched. The initial adjustment should be made to 0.060 inch (1.52 mm). Further adjustment is dictated by the operation of the solenoid or keylock mechanism.

DRAWER ROLLER

The purpose of these adjustments is to ensure smooth drawer operation without binds or excess lateral motion.

1. Adjust the rear guide rolls on the cash drawer for maximum spread by loosening the retaining nuts and turning the eccentrics in the desired direction. Install drawer and check for free-running condition in all drawer positions from closed to fully open. Readjust eccentrics as necessary to obtain free-running condition with minimum clearance between rolls and drawer frame.

2. Install shims behind the right and left front drawer rolls to obtain from 0.023- to 0.104-inches (0.58 to 2.64 mm) side play (total clearance) with the drawer open approximately 2 inches (50.8 mm). The shims under each roll must not exceed 0.030 inches (0.76 mm) and should be divided left and right to center the drawer as nearly as practical.

DRAWER CLOSED SENSING SWITCH

The purpose of this adjustment is to ensure that the drawer closed sensing switch makes contact at the proper point in the drawer travel.

Adjust the switch by loosening the retaining screws and moving it as needed so that the switch makes (clicks) 0.015 to 0.030 inches (0.38 to 0.76 mm) before the latch drops to retain the drawer.

Tighten the retaining screws.

KEYLOCK SWITCHES

The purpose of these adjustments is to ensure the keylock switches close and open at the proper point in the keys rotation.

Adjust each switch by forming the actuator leaf so that the switch closes when the key is turned approximately one quarter of a turn from the horizontal (OFF) position.

The Read/Reset key (center key) has two switches, one which operates when the key is turned clockwise and another which operates when the key is turned counterclockwise. Each switch should be individually adjusted as previously described so that approximately one quarter of a turn from the horizontal in the clockwise direction will cause the switch on the right to close without affecting the other and vice versa.

CABINET ADJUSTMENTS

The purpose of the cabinet adjustments is to ensure proper fit around the base and to position the receipt opening in the cabinet front so that the cabinet opening does not restrict receipt feeding.

1. To adjust the front of the cabinet, shims are inserted under the catch plate until dimension A is 0.050 inches ±.03 (1.27 ± .76 mm). Refer to figure G-8.

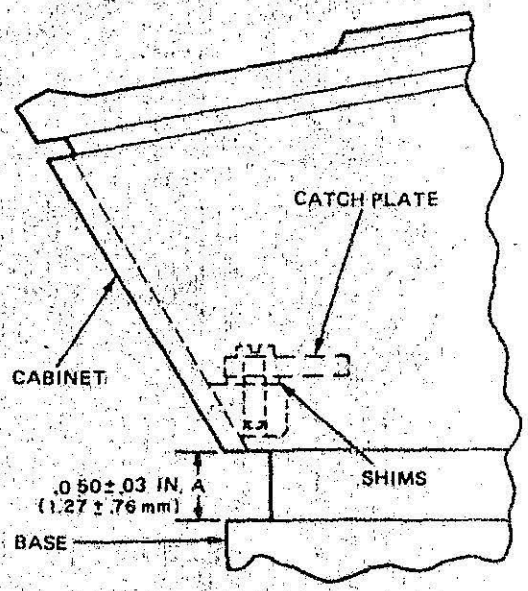


Figure G-8 Front cabinet adjustment

2. The rear of the cabinet is adjusted by loosening the two retaining screws and adjusting the screw plate up or down, using the set screws, until dimension B is 0.050 inches ±.03 (1.27 ± .76 mm). Retighten the screws when the dimension is correct. Refer to figure G-9. A soon to be released change in the design of the rear cabinet support eliminates the need for this adjustment.

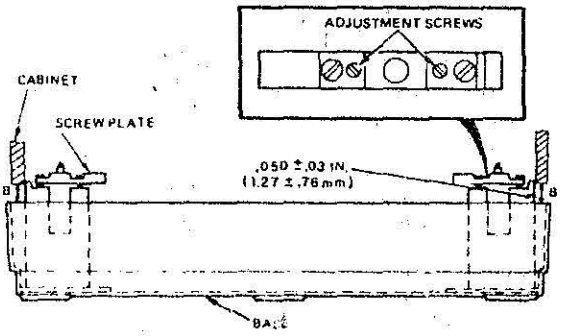


Figure G-9 Rear cabinet adjustment

CABINET SLIP TABLE ADJUSTMENT

The purpose of this adjustment is to align the 280 slip table so that it mates properly with the printer slip table and the cabinet.

1. Open the left-hand cabinet door and remove the two 280 slip table retaining screws.

2. Remove the 280 slip table by sliding it horizontally to the left side of the terminal until it stops and then lift vertically. The flat point set screws (larger screws) attach the slip table-locking rails to the cabinet, while the smaller socket head screws adjust the height of the slip table locking rails from the cabinet.

3. Loosen the larger screws and adjust the slip table locking rails up or down with the smaller screws so that when the 280 slip table is installed, the top surface is as nearly flush with the top surface of the printer slip table as possible.

4. Reinstall the 280 slip table by reversing the removal procedure. Press the right front edge slightly, if necessary, in order to permit it to mate properly with the slot in the printer. After the slip table is properly adjusted, tighten the two retaining screws.

POWER SUPPLY DESCRIPTION

The M32-2-280 power supply module provides eight different voltages for use in the 280 Retail Terminal. The voltages are used to operate the logic circuitry, solenoids, lamps, and indicators within the 280. The 280 peripherals also use voltages generated by the power supply. The voltages and their respective current limits are given in table G-6.

Table G-6 Output characteristics

Voltage	Tolerance	Current
+28 v.d.c.	+10 percent, -15 percent	2.00 amp.
-20 v.d.c.	±10 percent	0.20 amp.
+12 v.d.c.	±3 percent	2.00 amp.
-12 v.d.c.	±3 percent	0.75 amp.
-6.8 v.d.c.	±10 percent	0.25 amp.
+5.1 v.d.c.	±5 percent	0.12 amp.
-5.0 v.d.c.	±6 percent	1.10 amp.
3.2 v.a.c.	±10 percent	0.32 amp.

For 60 Hz power, the input voltage range is 85 to 127 volts. For 50 Hz power, the range is 85 to 127 volts and 200 to 260 volts. The 50 Hz version of the power supply uses a different input transformer than the 60 Hz power supply.

PHYSICAL CHARACTERISTICS

The power supply is located in the left rear corner of the 280 Retail Terminal. The supply occupies an area 12.00 inches (30.5 cm) long, 9.25 inches (23.5 cm) wide, and 9.00 inches (22.9 cm) high.

The power supply is shown in figure G-10. Various major components are called out on the drawing. These components include the heat sink, the cover plate with the fuses and terminal boards, the 12 v. regulator card, and the ferroresonant input transformer.

The heat sink, which faces the rear of the unit, contains the pass transistors for the +12 v. supply and the -12 v. supply, the drive transistors for the pass transistors, the rectifier bridge diodes for the +28 v. supply, the zener diode for the +5.1 v. supply, and the zener diode for the -6.8 v. supply. Mounted on the back of the heat sink is a voltage regulator card containing two hybrid circuits, one for each 12 v. supply.

The cover plate contains the terminal boards for connection of the input a.c. (TB1), terminal boards for the output d.c. (TB2 and TB3), the input a.c. fuse (F1), and the output d.c. fuses (F2 through F7). The components on the cover plate allow the technician to easily check the input voltage, output voltages, and the condition of the fuses.

The ferroresonant transformer, T1, is mounted in the base of the supply. This transformer supplies a.c. at various voltage levels for use in producing the various output voltages.

The remaining rectifier diodes and some resistors are mounted on a plate above the power supply.

ELECTRICAL CHARACTERISTICS

The power supply module is divided into seven separate segments. The segments correspond to the primary winding of the transformer and the six secondary windings. The input to the power supply is one segment. The remaining segments are the 3.2 v.a.c. supply, -5 v.d.c. supply, the +12 v.d.c. supply, the -12 v.d.c. supply, the -20 v.d.c. supply, and the +28 v.d.c. supply. A block diagram of the power supply is shown in figure G-11.

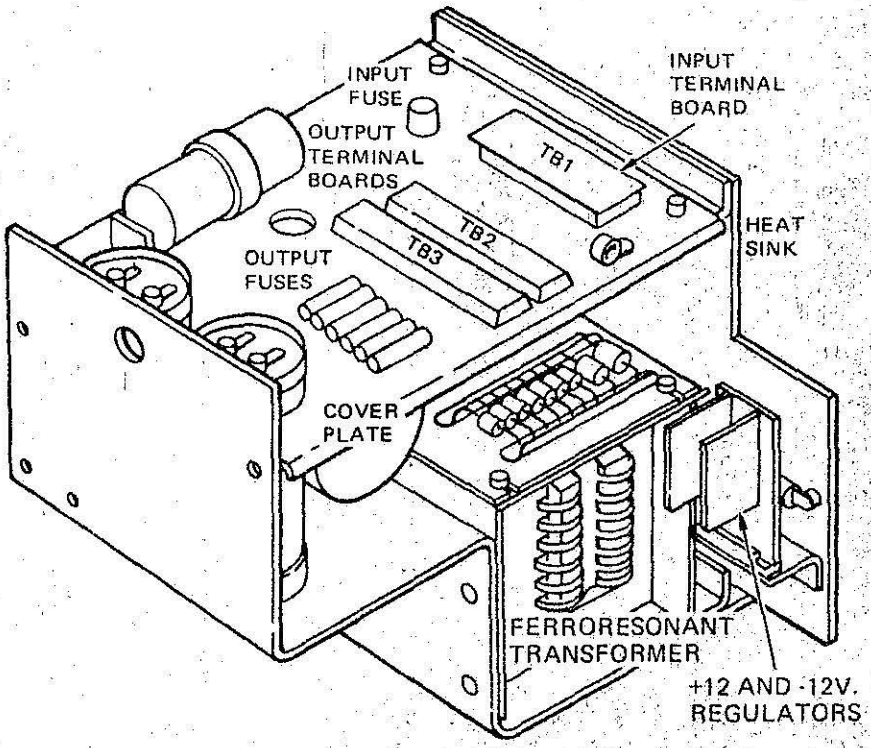


Figure G-10 M32-2-280 power supply

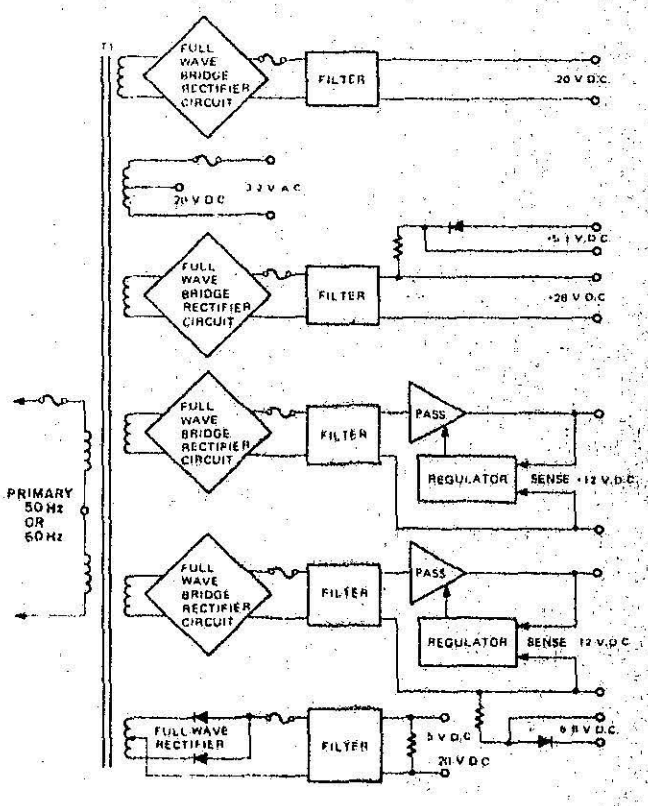


Figure G-11 Power supply block diagram

As shown in the block diagram, the +5 v.d.c. supply is derived from a zener diode in the +28 v.d.c. supply, and the -6.8 v.d.c. supply from a zener diode in the -12 v.d.c. supply.

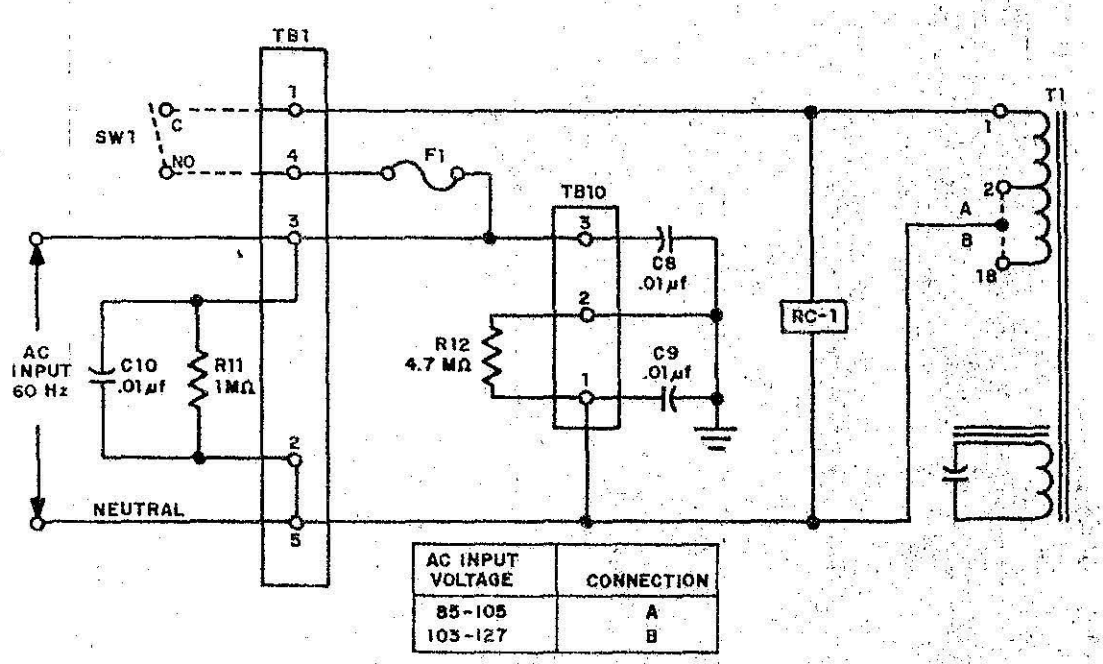
POWER SUPPLY INPUT

The primary circuits for the 60 and 50 Hertz power supplies are shown in figures G-12 and G-13 respectively. The primary circuits differ only in the connections to the transformer and the transformer jumpers. The RC noise filtering networks are the same for both supplies.

The ferroresonant transformer maintains the rated output of the secondary windings over the input voltage range. This regulation is accomplished through the action of a tank circuit consisting of a coil on the transformer core and a capacitor connected across the coil. The current through the primary winding of the transformer induces a voltage into the regulator coil as well as the secondary windings. The voltage induced into the regulator coil is stored by the capacitor. As the input voltage drops, the regulator capacitor discharges through the coil, providing a level of magnetization to the core. The magnetic fields of the primary winding and the regulator coil are additive and together provide the magnetic saturation level of the core.

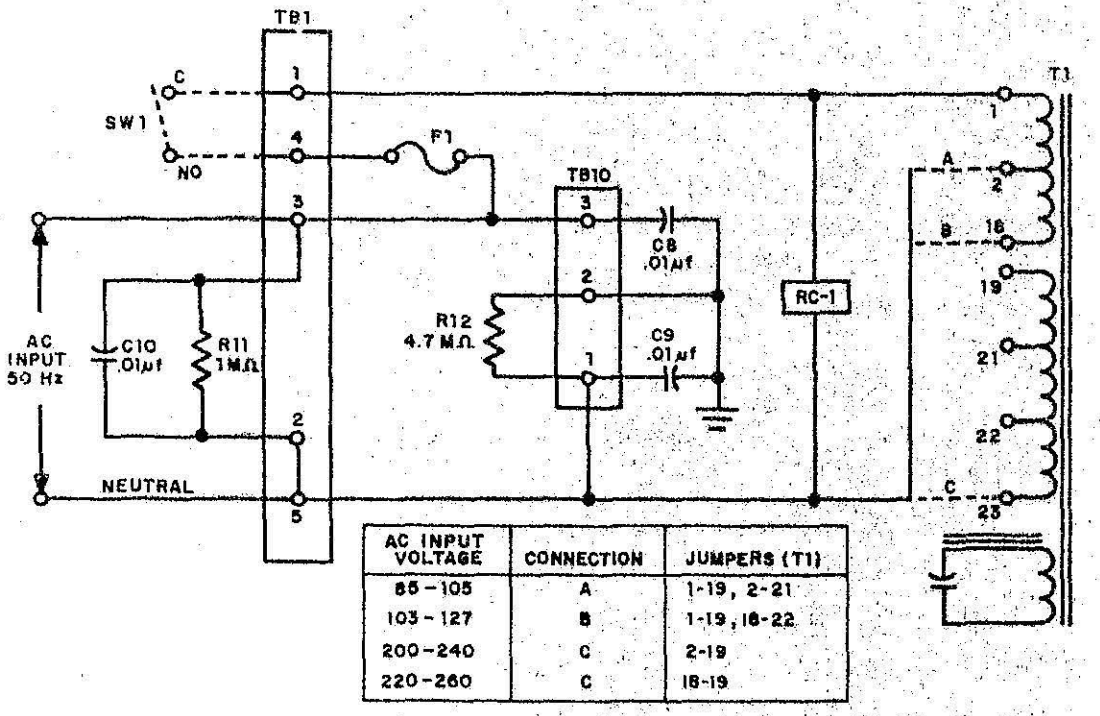
The input voltage at which saturation occurs is lower than the nominal peak input voltage. As the input voltage rises toward a peak in any given half cycle, the core goes into saturation before the peak is reached. The outputs of the various secondary windings rise toward a peak as the input rises; but, when the core saturates, the secondary windings outputs level off until the primary current drops.

The operating characteristics of the ferroresonant transformer result in very good voltage regulation with static and dynamic input line voltage changes. Since the secondary output voltage is nearly a square wave, relatively small filter capacitors can be used.



AC INPUT VOLTAGE	CONNECTION
85-105	A
103-127	B

Figure G-12 60 Hz primary circuit



AC INPUT VOLTAGE	CONNECTION	JUMPERS (T1)
85-105	A	1-19, 2-21
103-127	B	1-19, 18-22
200-240	C	2-19
220-260	C	18-19

Figure G-13 60 Hz primary circuit

POWER SUPPLY CIRCUITS

In the following descriptions of the power supply segments, the schematic diagram, shown in figure G-14, is to be referenced for component designations.

3.2 V.A.C. SUPPLY

The 3.2 v.a.c. is provided by the output of one of the secondary windings. The secondary is center tapped to -20 v.d.c. The output of the winding is 3.2 v.a.c., but the a.c. is riding on the -20 v.d.c. For this reason, the voltmeter must be referenced to -20 v.d.c. instead of ground when checking the 3.2 v.a.c. output.

The 3.2 v.a.c. supply provides a maximum current of 0.32 amp, but is fused for 1 amp. by fuse F7. The M90 operator display and 790 remote display use the 3.2 v.a.c. for display tube filament voltage.

-5 V.D.C. SUPPLY

The -5 v.d.c. supply consists of one center-tapped secondary winding, diodes CR17 and CR18, filter capacitor C5, shunt resistor R10, and a 3 amp. fuse, F5. This supply, rated at 1.1 amp., is used by the M90 operator display, the 790 remote display, and the 785 wand reader.

The center tap of the secondary winding is referenced to the output of the -20 v.d.c. supply. The -20 v.d.c. supply output terminal is the return point for current from the -5 v.d.c. supply.

The output terminal for -5 v.d.c., TB3-5, is ordinarily connected to the -5 v.d.c. shunt terminal, TB3-6. This jumper is required to ensure that sufficient current is drawn by the primary of T1 to permit the most efficient operation of the ferroresonant transformer.

Care should be taken when measuring the -5 v.d.c. that the measuring device is referenced to -20 v.d.c. and not to ground.

+12 V.D.C. SUPPLY

The +12 v.d.c. supply contains a secondary winding, a full-wave bridge rectifier (CR9, CR10, CR11, and CR12), a filter capacitor (C3), a 3 amp. fuse (F3), a hybrid voltage regulator (M1), and a pass transistor (Q1) with an associated driver transistor (Q2). A filter capacitor, C6, is also provided for the regulated output.

The hybrid regulator, M1, contains a zener diode to establish a reference level for the differential amplifier. The regulated voltage input to this regulator is derived from zener diode CR21 which is connected to the +28 v.d.c. supply. The +28 v.d.c. supply also provides current for the pass transistor driver, Q2.

The output of the +12 v.d.c. supply, which is distributed to all modules, is monitored by the differential amplifier. Voltage variations are amplified and applied to the base of the pass transistor driver Q2. The conduction of Q1, the pass transistor, is controlled by Q2. When the output voltage increases beyond the nominal +12 v. output, the

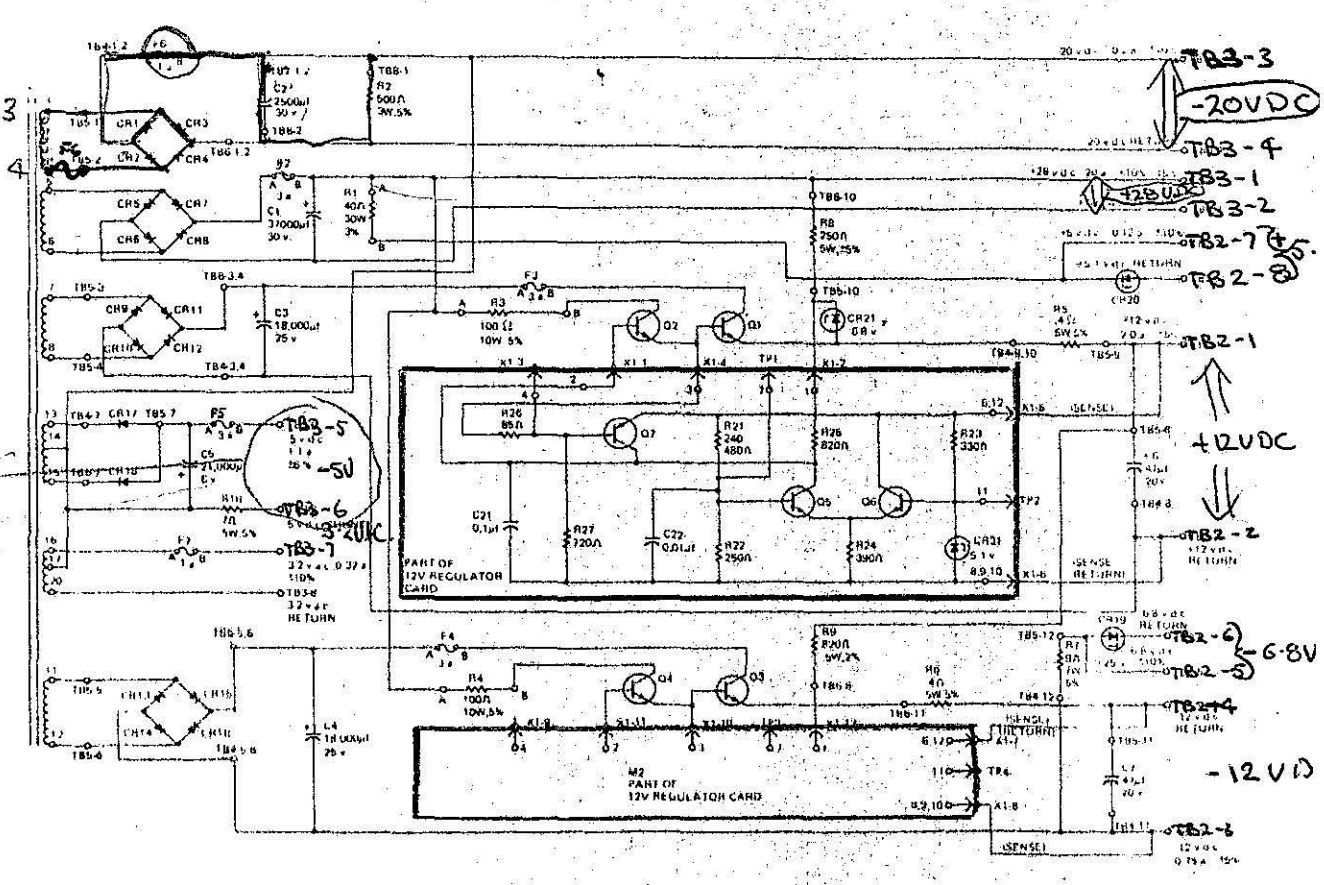


Figure G-14 Power supply schematic, secondary circuits

potential at the base of Q2 decreases. The decreased conduction of Q2 decreases the current flow through Q1 and drops the output voltage In the event that the output voltage decreases, Q1 and Q2 increase conduction to raise the output voltage.

-12 V.D.C. SUPPLY

The -12 v.d.c. supply output is distributed to all modules. The supply consists of the full-wave bridge rectifier (CR13, CR14, CR15, and CR16), filter capacitor (C4), 3 amp. fuse (F4), hybrid regulator (M2), and pass transistor (Q3) with its associated drive transistor (Q4). The regulated output is filtered by C7.

The circuitry and operation of the hybrid regulator, M2, is identical to that of M2 in the +12 v.d.c. supply. The current for the pass transistor driver, Q4, is provided by the +28 v.d.c. supply; but, unlike the +12 v.d.c. supply, the +28 v.d.c. supply does not provide the regulated voltage input to the hybrid. The regulated voltage input is the output of the +12 v.d.c. supply.

The -6.8 v.d.c. used as the logic ONE voltage level on modules containing MOS-LSI arrays is derived from the output of the -12 v.d.c. supply. The zener diode, CR19, is used to provide a regulated -6.8 v.d.c. output.

-20 V.D.C. SUPPLY

The -20 v.d.c. used by the display modules and the wand reader is provided by a power supply consisting of a full-wave bridge rectifier (CR1, CR2, CR3, and CR4), a filter capacitor (C2), a load resistor (R2), and a 1 amp. fuse (F6). Regulation for this supply is provided by the action of the ferroresonant transformer.

+28 V.D.C. SUPPLY

In addition to supplying current for the +12 v.d.c. and -12 v.d.c. supply regulators, the +28 v.d.c. supply provides current for the cash drawer solenoid, printer solenoids, and the anode drive circuitry display tubes. The +5.1 v.d.c. used by TTL logic of the clock module is also derived from the +28 v.d.c. supply output.

The supply consists of a full-wave bridge rectifier (CR5, CR6, CR7, and CR8), a filter capacitor (C1), and a 3 amp. fuse (F2). The regulation for the +28 v.d.c. supply is provided by the regulating characteristics of the transformer T1. The zener diode, CR20, provides regulation for the +5.1 v.d.c. supply.

BENCH TESTING AND LOADING PROCEDURE

The M32-2-280 power supply cannot be bench tested without a load. Without a load on the +28 v.d.c. output, the +12 v.d.c. supply and the -12 v.d.c. supply will not operate. An overvoltage condition may result if the +12 v.d.c. and the -12 v.d.c. supplies are operated without a load.

To properly load the supply outputs, resistors of sufficient value to draw at least 1/2 the rated current output of a supply are connected across the supply output terminals: For example, to properly load the +28 v.d.c. supply, a resistance of no more than 28 ohms must be used to draw at least 1 amp. The power rating of the resistors used must also be considered. The power rating of the resistors must be at least sufficient to handle the current drawn at the rated voltage.

Any resistor which provides a proper load may be used. The following list provides suggested load resistors for the +28 v.d.c., +12 v.d.c., and -12 v.d.c. supplies.

+28 v.d.c.	25 ohm	50 watt
+12 v.d.c.	10 ohm	25 watt
- 12 v.d.c.	30 ohm	10 watt

The 3.2 v.a.c., +5.1 v.d.c., -5 v.d.c., -6.8 v.d.c., and -20 v.d.c. can be operated without a load. If a failure is suspected in one of these supplies, a load can be applied. The load resistance ranges for each voltage are shown in the following.

3.2 v.a.c.	10-20 ohm	1 watt
+5.1 v.d.c.	42-85 ohm	1 watt
- 5 v.d.c.	5-9 ohm	10 watt
- 6.8 v.d.c.	26-52 ohm	2 watt
- 20 v.d.c.	100-200 ohm	5 watt

NOTE: Return voltages must be tied together at TB3-2, TB2-8, TB2-2, TB2-6, and TB2-4; then tied to ground at E1.

The output terminals for the supplies are listed:

+28 v.d.c.	TB3-1 and TB3-2,
+12 v.d.c.	TB2-1 and TB2-2,
- 12 v.d.c.	TB2-3 and TB2-4.

TROUBLESHOOTING

INTRODUCTION

This section contains information to help the Technical Service Representative in isolating faults in the C-280 system.

Troubleshooting information is divided into two parts, C-280 aids and C-723 aids. A section on system problems is not included because system conditions are exclusively communication problems. The approach used in this section is to start with the C-280 procedures for isolation of malfunctions. Communication faults are indicated at the C-280 by an error printout, whether the C-280 is in the customer program or the diagnostic mode.

If the C-280 fault isolation procedures indicate that the problem is in the C-723, a separate set of procedures is provided for that unit.

Also included in this section is a guide to troubleshooting the C-785 Wand Reader.

The only information which is not peculiar to one unit or the other is the communication line test procedures.

C-280 FAULT ISOLATION PROCEDURES

ISOLATION OF MALFUNCTIONS OCCURRING DURING UPSEQUENCE

SYMPTOM	PROBABLE CAUSE AND REMEDY
1. Error light (DS3) does not illuminate when the power ON switch (SW1) is initially activated.	1. Switch SW1 defective or out of adjustment Check SW1 performance with a meter and adjust or replace as required. 2. Power supply (M-32) malfunction Check voltages at TB1, TB2, and TB3 for proper operating levels. Refer to M-32 Troubleshooting Procedures if voltage failure. 3. Terminal clock (M-19) malfunction Check TCIR switch performance by probing TCIR.G/ at M17-J1-25. The d.c. meter reading should vary with the pressing and releasing of the TCIR switch. Check PH1 operation by probing PH1.JBG at M17-J1-1. The a.c. meter reading should be between 12 and 17 volts r.m.s. Check PH3 operation by probing PH3.JBH at M01-J1-4. The a.c. meter reading should be 12 to 17 volts r.m.s. Check PH1 and PH3 distribution to the TCU by probing PH1.JA and PH3.JA at M15-J1-2 and M15-J1-3 respectively. This check must be made with the TCU removed from the unit. The a.c. meter reading should be from 12 to 17 volts r.m.s. If a failure is detected during any of the above checks, either replace the M-19 or refer to the M-19 Troubleshooting Procedures, depending on the availability of replacements. 4. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshootin Procedures depending on the availability of replacements

SYMPTOM	PROBABLE CAUSE AND REMEDY
1. (continued)	5. TCU (M-15) malfunction Replace the TCU. 6. Wiring harness failure Refer to the Field Print Package and perform checks of the wiring interconnections associated with the modules listed for this symptom.
2. Error light (DS3) does not illuminate during upsequence; but, approximately 4 seconds after power is applied, the tone is sounded.	1. Error Light (DS3) burned out Check filament continuity; replace lamp if open. 2. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures depending on the availability of replacements. 3. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
3. Error light remains ON solid and the tone does not sound.	1. CDV check failure (location 000-224) due to data loss Activate PROGRAMMING mode by actuating the Programming Keylock, and perform a core dump. Compare the resulting printout to that of a previous core dump and load the read/write memory with the correct data including the check digit. Power down, and reattempt upsequence. If symptom 3 occurs, proceed to step 2. 2. Read/write memory (M-17) malfunction Replace the memory or refer to the M-17 Troubleshooting Procedures depending on the availability of replacements. 3. TCU (M-15) malfunction Replace the TCU. 4. Wiring harness failure Refer to the Field Print Package and check the associated wiring connections.
4. Tone does not sound after completion of the CDV check phase of upsequence.	1. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures depending on the availability of replacements. 2. Speaker (LS1) malfunction Check speaker coil; replace speaker if coil is shorted or open. 3. Wiring harness failure.

SYMPTOM	PROBABLE CAUSE AND REMEDY
4. (continued)	Refer to the Field Print Package and check the associated wiring interconnections.
5. Tone stays ON.	1. Read/write failure in one or more locations of the read/write memory (locations 226 through 352). Enter Diagnostic Programming mode and perform a core dump of locations 226 through 352. To determine if a particular location cannot be written into, attempt writing the data 377 into each location from 226 through 352. *NOTE:* Do not write into locations 314, 315, or 316. These locations are used as work areas by the firmware. If data cannot be read and written in the locations from 226 through 352 octal, a read/write memory malfunction is probable. 2. Read/write memory (M-17) malfunction Replace the memory or refer to the M-17 Troubleshooting Procedures depending on the availability of replacements. 3. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures depending on the availability of replacements. 4. TCU (M-15) malfunction Replace the TCU.
6. Qualification panel lights do not illuminate at completion of upsequence.	1. Cash drawer open Close drawer. 2. Cash drawer switch (SW5) failure Adjust or replace SW5 as required. 3. One or both qualification panel lamps (DS1 or DS2) burned out (these lamps are wired in series). Check continuity; replace faulty lamp. 4. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures as required. 5. TCU (M-15) malfunction Replace the TCU. 6. Operator display (M-90) malfunction (failed to send a READY status to the TCU). Replace the display or refer to the M-90 Troubleshooting Procedures as required. 7. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.

C-280 POWER UPSEQUENCE FLOW (FIG. E-1)

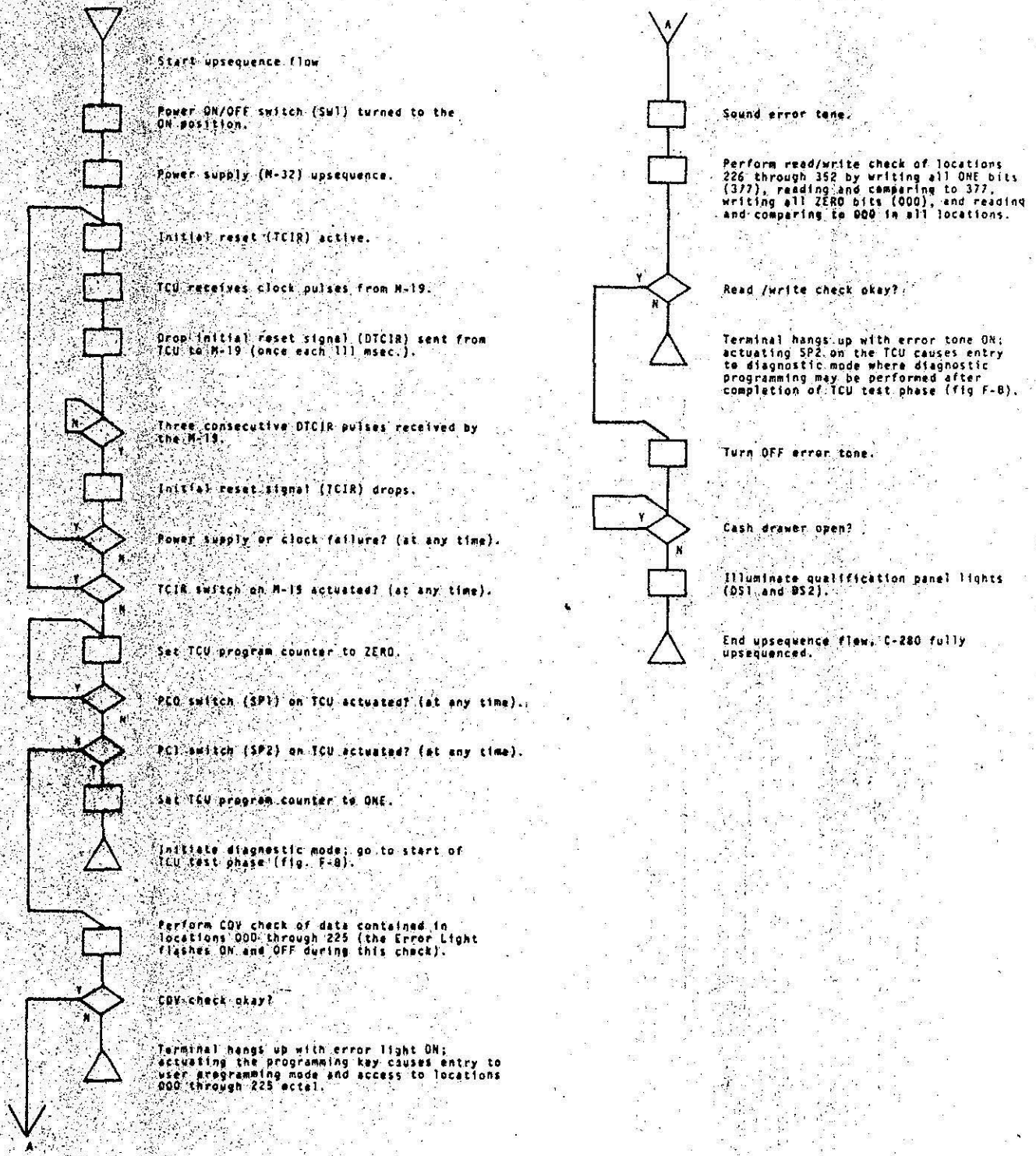

Start upsequence flow
Power ON/OFF switch (SW1) turned to the ON position.
Power supply (M-32) upsequence.
Initial reset (TCIR) active.
TCU receives clock pulses from M-19.
Drop initial reset signal (DTCIR) sent from TCU to M-19 (once each 111 msec.).
Three consecutive DTCIR pulses received by the M-19.
Initial reset signal (TCIR) drops.
Power supply or clock failure? (at any time).
TCIR switch on M-19 actuated? (at any time).
Set TCU program counter to ZERO.
PC0 switch (SP1) on TCU actuated? (at any time).
PC1 switch (SP2) on TCU actuated? (at any time).
Set TCU program counter to ONE.
Initiate diagnostic mode; go to start of TCU test phase (fig. F-8).
Perform CDV check of data contained in locations 000 through 225 (the Error Light flashes ON and OFF during this check).
CDV check okay?
Terminal hangs up with error light ON; actuating the programming key causes entry to user programming mode and access to locations 000 through 225 octal.
A
Sound error tone.
Perform read/write check of locations 226 through 352 by writing all ONE bits (377), reading and comparing to 377, writing all ZERO bits (000), and reading and comparing to 000 in all locations.
Read /write check okay?
Terminal hangs up with error tone ON; actuating SP2 on the TCU causes entry to diagnostic mode where diagnostic programming may be performed after completion of TCU test phase (fig F-8).
Turn OFF error tone.
Cash drawer open?
Illuminate qualification panel lights (DS1 and DS2).
End upsequence flow, C-280 fully upsequenced.

Fig. E-1 C-280 power upsequence flow

USING THE RESIDENT DIAGNOSTIC AS AN AID TO FAULT ISOLATION

SYMPTOM	PROBABLE CAUSE AND REMEDY
1. Tone does not turn ON when entering diagnostic mode	1. PC1 switch (SP2) on the TCU logic board defective. Check SP2 operation; replace if required. 2. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures as required. 3. TCU (M-15) malfunction Replace the TCU 4. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
2. Tone remains ON	1. TCU (M-15) malfunction (TCU logic or DR check failure) Replace the TCU. 2. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures as required. 3. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
3. Error light does not illuminate when the tone turns OFF	1. Error light (DS3) burned out Check filament continuity; replace lamp if open. 2. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures as required. 3. TCU (M-15) malfunction Replace the TCU. 4. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
4. Error light remains ON longer than 8 seconds.	1. TCU (M-15) malfunction (real time clock count-down failure) Replace the TCU. 2. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures as required.
5. Error light remains ON less than 6 seconds.	1. TCU (M-15) malfunction (real time clock count-down failure).

SYMPTOM	PROBABLE CAUSE AND REMEDY
6. TCU test continues to recycle after a key has been pressed.	1. Keyboard (M-01) malfunction Replace the keyboard or refer to the M-01 Troubleshooting Procedures as required. 2. TCU (M-15) malfunction Replace the TCU. 3. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
7. Printer motor fails to turn ON at completion of TCU test phase.	1. Helical printer (M-43) malfunction Check fuse F7; replace if open. Refer to M-43 Troubleshooting Procedures. 2. TCU (M-15) malfunction Replace the TCU. 3. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
8. Data is not displayed on the Operator Display when data is entered.	1. Operator display (M-90) malfunction Refer to the M-90 Troubleshooting Procedures. 2. TCU (M-15) malfunction Replace the TCU. 3. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
9. The keyboard click does not sound as data keys are pressed during keyboard input.	1. TIC (M-18) malfunction Replace the TIC or refer to the M-18 Troubleshooting Procedures as required. 2. TCU (M-15) malfunction Replace the TCU. 3. Keyboard (M-01) malfunction Replace the keyboard or refer to the M-01 Troubleshooting Procedures. 4. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
10. Printing does not occur, but printer motor is ON.	1. Helical printer (M-43) malfunction Refer to the M-43 Troubleshooting Procedures.

SYMPTOM	PROBABLE CAUSE AND REMEDY
10. (continued)	2. TCU (M-15) malfunction Replace the TCU. 3. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
11. Improper transaction sequencing or hang-up during the Test Transaction phase of diagnostic mode.	1. Read/write memory (M-17) incorrectly programmed Access the programming sequence and check the content of the transaction control or constant word being used at the point of failure. Refer to a core dump printout made prior to the occurrence of the malfunction. Reference may also be made to the programming section of MS-246 *(C-280 Retail Terminal Unit Description)*. Perform the program changes required. 2. TCU (M-15) malfunction Replace the TCU. A TCU failure at this time indicates a probable ROM failure. Isolate the malfunction to either the logic board or the ROM board by replacing only the ROM board of the defective TCU. If replacement of the ROM board corrects the problem, an ROM failure is indicated. If the problem is not corrected, failure of the Common Port Interface logic on the TCU logic board is indicated (TCU test phase of diagnostic does not check out the entire Common Port Interface). 3. Malfunction of the module or remote unit being used for input or output at the point of failure Refer to the Troubleshooting Procedures of the indicated module or remote unit. 4. Wiring harness failure Refer to the Field Print Package and check the associated wiring interconnections.
12. Journal printout of ////7NT//// (unable to establish a communication line)	1. Failure to raise input carrier to the C-723 Check input carrier presence during the time that the COMM ALERT light is flashing by measuring the transmitted signal across points TELXC and TELX6 of Interconnector Panel A1. A meter reading of approximately 0 dbm indicates that input carrier is being generated by the C-280. If input carrier is not being generated, install a jumper connector on J2 of the Modem which straps J2-25 (-12 v.) to J2-3 (CIRQL) and recheck input carrier presence.

SYMPTOM	PROBABLE CAUSE AND REMEDY
12. (continued)	If input carrier is still not being generated, replace the modem (M-51). If input carrier is being generated with the modem strapped, replace the TCA (M-50). After replacing the TCA and still no input carrier, replace the TCU. Refer to the Field Print Package and check the associated wiring interconnections. 2. Failure to receive output carrier from the C-723 Check output carrier reception during the communication sequence by measuring the receive signal across points TELRC and TELR6 of Interconnector Panel A1. A meter reading of from approximately -8 dbm to 0 dbm indicates that output carrier is being received by the C-280. A failure to receive output carrier after having sent input carrier indicates that the problem lies with either the communication lines or the C-723. Check the transmit pair of lines from the C-280 to the C-723 by measuring the signal received at the C-750. A failure to receive input carrier at the C-750 indicates a break in the communication lines. If the C-723 receives input carrier at the C-750, the problem lies either in the C-723 or with the transmit pair of lines from the C-723 to the C-280. Check C-723 operation by measuring the transmit signal at the C-750 (this signal should be approximately 0 dbm). If output carrier is not seen at the C-750, refer to the C-723 Fault Isolation Procedures. Output carrier being present at the C-750 and not received by the C-280 indicates a break in the communication lines. Check the communication lines between the telephone jack and the C-750 by following the procedures outlined in the Communications Line Tests. Check the communication lines between the telephone jack and Interconnector Panel A1 of the C-280 by terminating both the transmit and receive lines with known resistances at the telephone jack: By measuring the resistance at Interconnector Panel A1, opens or shorts may be detected (the modem must be removed during this check to prevent erroneous readings). 3. C-280 failure to acknowledge receipt of output carrier After determining that output carrier is being received at the receive input to Interconnector Panel A1, replace the Modem. If after replacing the modem the symptom is still present replace the TCA (M-50). If the symptom is still present, replace the TCU (M-15).

SYMPTOM	PROBABLE CAUSE AND REMEDY
12. (continued)	Refer to the Field Print Package and check the wiring interconnections from the input of A1 (TELRC and TELR6) through the common port interface wiring between the TCU and the TCA.
13. Journal printout of /////6NT///// Loss of output carrier during message transfer (once in diagnostic or dropped twice if in user mode). The occurrence of this symptom indicates that a communication path has been previously established; if not, a 7NT would have been printed.	1. The C-280 failed to send data after establishing a line; the C-723 waits 350 msec. for data and then drops output carrier. Refer to the scope procedures for checking input data at the C-750 and check to see that data is being received at the C-723. If data is not being received from the C-280, replace the modem in the C-280 Replace the TCA if modem replacement does not cure the symptom Replace the TCU. 2. The C-723, due to a logic failure, dropped the output carrier. Refer to the C-723 Fault Isolation Procedures. 3. Intermittent break in the communication line Refer to the Communication Line Tests and check the communication lines.
14. Journal printout of /////5NT///// C-280 received EOT or DLE-EOT when expecting an ACK or NAK response to a transmitted data message (occurred once in diagnostic or twice if in user mode). The occurrence of this symptom indicates that a communication line has been established and the output carrier did not drop; if not, a 7NT or a 6NT would have been printed.	1. The C-280 transmitted a data message without sending any control characters. Replace the TCU first, then the TCA. 2. The C-723, due to a logic failure, does not recognize the control characters received Refer to the C-723 Fault Isolation Procedures.
15. Journal printout of /////4NT///// C-280 receives no reply from the C-723 when expecting an ACK or NAK response. The C-280 has sent three ENQ's if in diagnostic or six ENQ's if in user mode.	1. The C-723 fails to respond to the data message received or the C-280 does not recognize the response Refer to the C-723 Fault Isolation Procedures and check the transmit capability of the C-723 modem. If the C-723 is transmitting data (observed at the C-750), check the communication lines. Replace the modem in the C-280. Replace the TCA in the C-280. Replace the TCU in the C-280.
16. Journal printout of /////3NT///// A NAK is sent from the C-723 to the C-280 in response to a data message when a character parity error or BCC error is detected by the C-723 or when the C-723 expects an STX and receives an ETX or ENQ. This printout occurs when three NAK's are received in diagnostic or six NAK's in user mode.	1. TCA (M-50) failure Replace the TCA. 2. TCU (M-15) failure Replace the TCU. 3. Noisy communication lines

SYMPTOM	PROBABLE CAUSE AND REMEDY
16. (continued)	Refer to the Communication Line Tests and check the lines. 4. C-723 logic failure Refer to the C-723 Fault Isolation Procedures.
17. Journal printout of /////2NT///// This printout indicates that the system has recovered from a potential error (3NT) after two NAK's have been received by the C-280, but an intermittent condition still exists. The 2NT printout occurs only during diagnostic operation. This symptom does not cause the C-280 to go offline but does increase system throughput time due to retries.	1. The probable cause and remedy of this symptom is the same as that listed for symptom number 16, but a deterioration of the communication lines is most probable.
18. Journal printout of /////1NT///// This printout indicates that the system has recovered from a potential error (3NT) after only one NAK has been received by the C-280. This symptom, like number 17, only results in a printout during diagnostic operation and does not cause the C-280 to go offline.	1. The probable cause and remedy of this symptom is the same as that listed for symptom number 16, but as in symptom 17, a deterioration of the communication lines is most probable.

C-280 DIAGNOSTIC MODE FLOW (FIG. E-2)

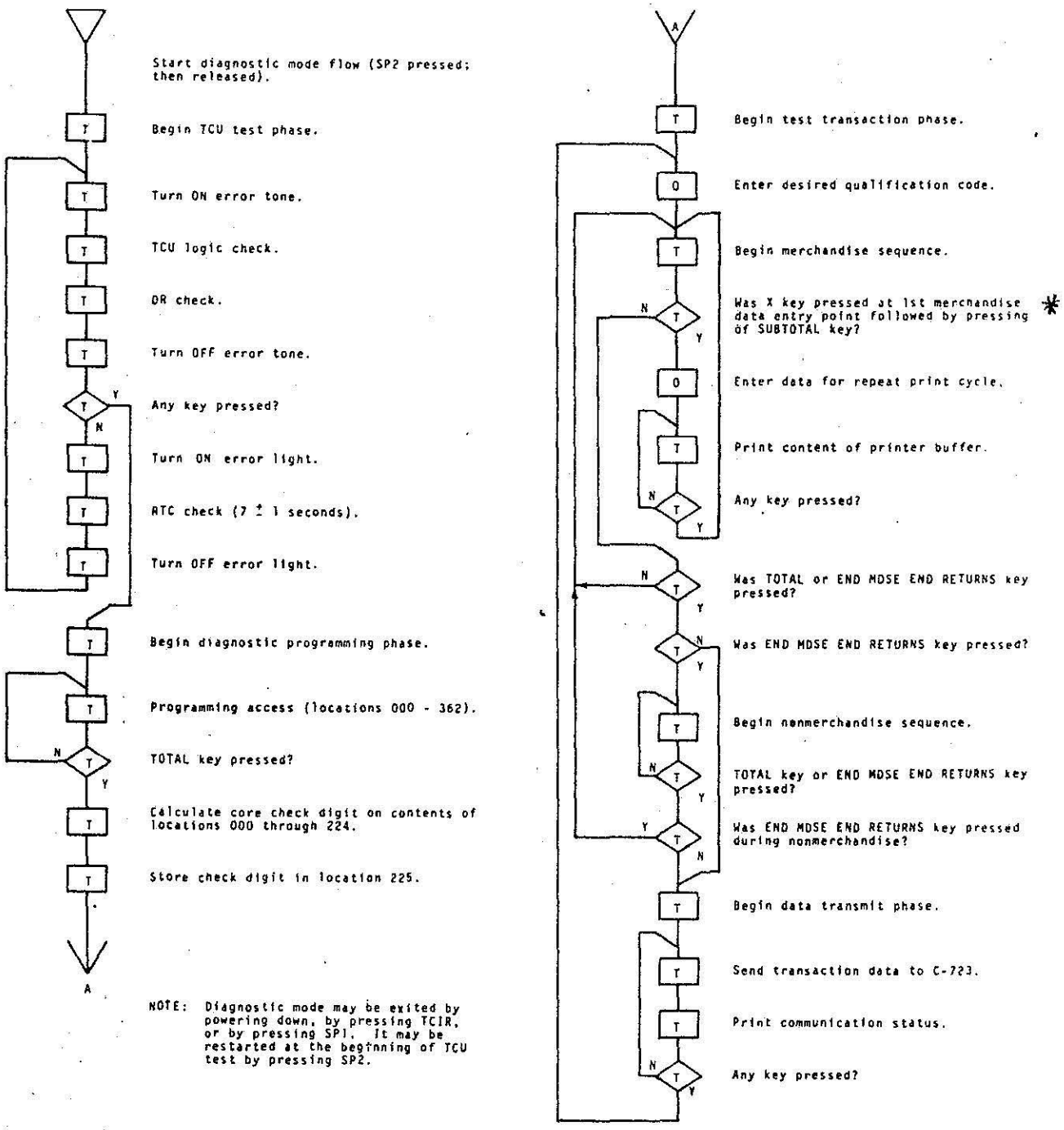
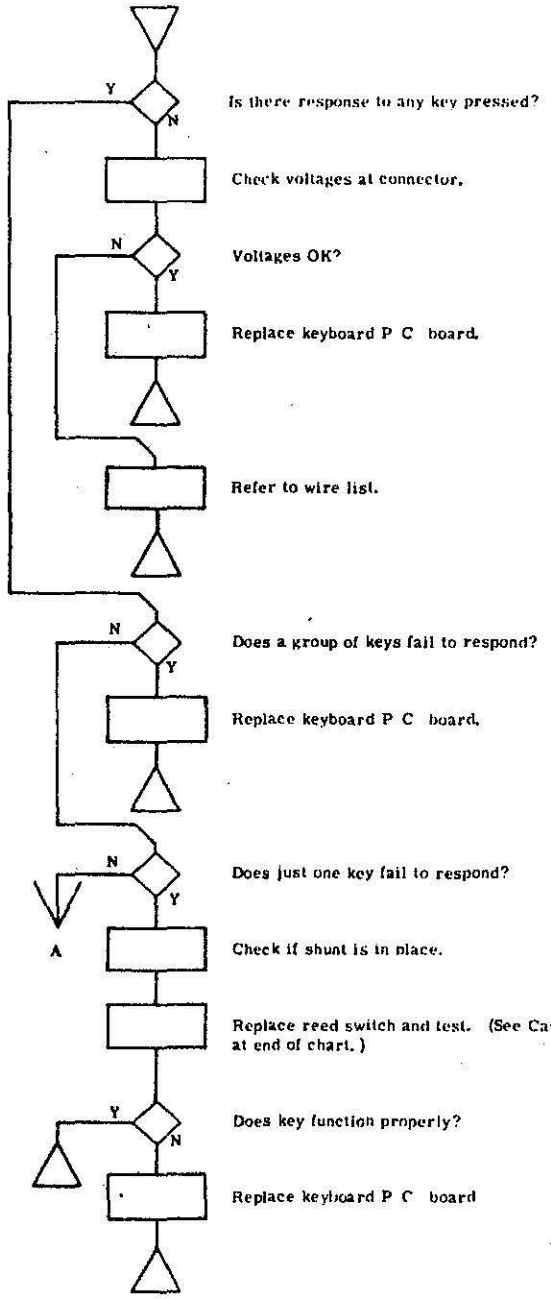
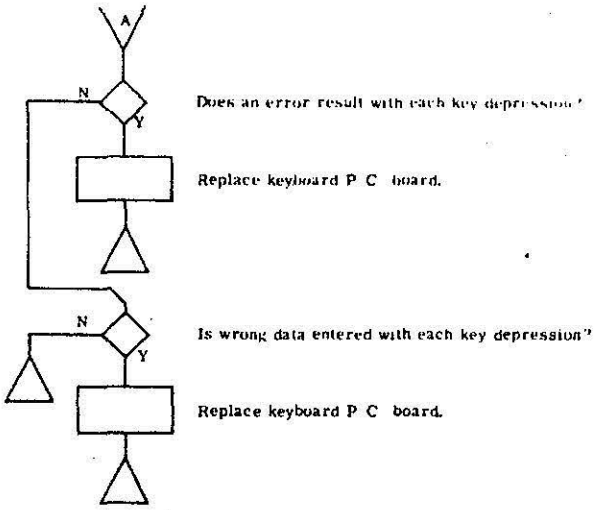

Start diagnostic mode flow (SP2 pressed; then released).
Begin TCU test phase.
Turn ON error tone.
TCU logic check.
DR check.
Turn OFF error tone.
Any key pressed?
Turn ON error light.
RTC check (7 ± 1 seconds).
Turn OFF error light.
Begin diagnostic programming phase.
Programming access (locations 000 - 362).
TOTAL key pressed?
Calculate core check digit on contents of locations 000 through 224.
Store check digit in location 225.
A
NOTE: Diagnostic mode may be exited by powering down, by pressing TCIR, or by pressing SP1. It may be restarted at the beginning of TCU test by pressing SP2.
A
Begin test transaction phase.
Enter desired qualification code.
Begin merchandise sequence.
Was X key pressed at 1st merchandise data entry point followed by pressing of SUBTOTAL key?
Enter data for repeat print cycle.
Print content of printer buffer.
Any key pressed?
Was TOTAL or END MDSE END RETURNS key pressed?
Was END MDSE END RETURNS key pressed?
Begin nonmerchandise sequence.
TOTAL key or END MDSE END RETURNS key pressed?
Was END MDSE END RETURNS key pressed during nonmerchandise?
Begin data transmit phase.
Send transaction data to C-723.
Print communication status.
Any key pressed?

Fig. E-2 C-280 diagnostic mode flow

M-01-1-280 KEYBOARD TROUBLESHOOTING FLOW (FIG. E-3)





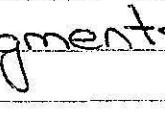
CAUTION: When replacing the reed switches, care should be taken not to bend the leads extending from each end of the switches. Flexing these leads may fracture the glass capsule and cause the inert gas inside to escape. The switches are then contaminated by the outside air, shortening their life.

Avoid trimming excess wire from a switch until after it has been installed. The shock from the cutters may fracture the capsule. If the leads must be trimmed before installation, hold the switch with a pair of pliers between the switch and the cutters.

Do not use a switch if it has been dropped.

Fig. E-3 M-01-1-280 keyboard troubleshooting flow

280 Boards — Trouble Shooting

Symptom	Cause
When powering up funny lights on display e.g. - - - - - - - - funny indicator lights etc.	TIC not generating proper clock signals. Moniter picking up wrong clock signal or wrong voltage. (1st change clock then test voltages). (Clean clock contacts on board or mother board contacts). (Test clock Signals with scope). ~~(Old Style clock Voltages on TP's)~~
Dull Display	Possibly Fuse Blown (F
Descriptor light blown	P.N. 006-0005155 Lamp.
Display Segments	
TCU Rom Problems -Hard on tone and numeric display. - no power up.	

TCU logic Board

No power up.

Tic

No Tone.

Printer logic

- No Print - motor starts.
- Slip Stop opens.
- Reciept not cut

CLOCK.

- Random Display Hardon. at power up.
- odd problems at power up.

280 Boards Troubleshooting

Sections of mem lost with a patten.	Clean plug s pins on memory driver board s replace. If happen again replace driver bouard (memory) and test. If happens again then something is blowing the driver.
Sections of memory change without paten.	Check binary code of changed numbers. See if only one bit affected. Clean Pins. Check for clean line or any external interferance Reload programme and try again. If it happens again try driver board If it happens again something blowing driver board. If a once only problem then probably caused by interferance. If has happened before the check sight.
If completely random memory change	Possible - Driver Board (memory) not work during power up. (Change Driver). - Possibly motor arking or problem with printer driver board (Change Driver) - change relay and two assocd capacitors.

If Can't write in memory. Memory Dropping	Memory Board Problem
Motor Overheating Rough Running	Check Print driver's for something jammed in machine.
If hard on tone s Display h2A3.3+1 or 2+1	Trouble with driver (memory) erase or memory core
Machine with coupon draw will not power up. Cabel panel lights will not come on.	Check Switch is not at all adjustment To adjust hit bottom of bracket lightly
If the lock can't be turned or key can't be taken out.	Then check for missing pin - If necessary take out first plunger
RES ///// appears at end of Reset ticket	Machine has been operated off line at some time during